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Proceedings on

WATER QUALITY MANAGEMENT

(in the Susquehanna River Basin)

SUSQUEHANNA RIVER BASIN COMMISSION
SECOND QUARTERLY MEETING

The Susquehanna River Basin Commission was created as an independent agency by a Federal-Interstate Compact* among the States of Maryland, New York, Commonwealth of Pennsylvania and the Federal Government. In creating the Commission, the Congress and State Legislatures formally recognized the water resources of the Susquehanna River basin as a regional asset vested with local, State and National interests for which all the parties share responsibility. As the single Federal-Interstate water resources agency with basinwide authority, the Commission's goal is to effect coordinated planning, conservation, management, utilization, development and control of basin water resources among the government and private sectors.

SUSQUEHANNA RIVER BASIN COMMISSION

Hugh L. Carey Governor of New York	Alternate:	Dr. Theodore L. Hullar Dep. Commissioner for Programs and Research New York DEC
Marvin Mandel Governor of Maryland	Alternate:	Henry Silbermann Asst. Secretary for Environmental Matters Maryland DNR
Milton J. Shapp Governor of Pennsylvania	Alternate:	Dr. Maurice K. Goddard Secretary Pennsylvania DER
Cecil D. Andrus U.S. Secretary of the Interior	Alternate:	Thomas C.H. Webster U.S. Commissioner Susquehanna River Basin Commission

Robert J. Bielo
Executive Director

* Statutory Citations: Federal - Pub.L. 91-575, 84 Stat. 1509 (December, 1970); Maryland - Natural Resources §8-301 (Michie 1974); New York - ECL §21-1301 (McKinney 1973); and Pennsylvania - 32 P.S. 820.1 (Supp. 1976).

PROCEEDINGS

SUSQUEHANNA RIVER BASIN COMMISSION'S
SECOND QUARTERLY MEETING
CAMP HILL, PENNSYLVANIA
JANUARY 8, 1976

ON

WATER QUALITY MANAGEMENT

IN THE

SUSQUEHANNA RIVER BASIN

EDITED BY:

ROY G. METZGAR
SECRETARY TO THE COMMISSION

APRIL 1977

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SUSQUEHANNA RIVER BASIN COMMISSION
5012 LENKER STREET
MECHANICSBURG, PENNSYLVANIA 17055

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SECOND QUARTERLY MEETING

NEW YORK

Dr. David Allee, New York Advisor

PENNSYLVANIA

Dr. Maurice K. Goddard, Alternate for
Governor Milton J. Shapp

MARYLAND

Mr. Paul McKee, Alternate for
Governor Marvin Mandel

FEDERAL

Mr. Thomas C. H. Webster, Alternate for
Federal Member

INTRODUCTION

This report serves as the official record of the Susquehanna River Basin Commission's Second Quarterly Meeting held January 8, 1976, at the Penn Harris Motor Inn in Camp Hill, Pennsylvania.

The day-long meeting addressed the topic of Water Pollution Control and Water Quality Management in the Susquehanna River Basin. Key personnel from Federal and State agencies as well as the SRBC staff briefed the Commission and public in attendance on the topic. There were also presentations by some of those who are affected by water quality legislation and program implementation such as the electrical power companies and the coal mining industry.

The meeting summary was not presented at the meeting for two reasons. First, the length of the meeting had obviously already over-taxed people's ability to maintain interest and effective participation. Second, due to the number of presentations and their content, without advance text copy, effective summarization was impossible at the meeting. Thus, the summary benefits hopefully from the advantage of study of each of the presentations and the overall content of the meeting.

This report contains a complete transcript of the proceedings including questions and comments from the Commissioners, audience and speaker replies.

The intent or purpose of the meeting is presented immediately following in the opening remarks of the Commission's Executive Director, Robert J. Bielo.

OPENING REMARKS

by
Robert J. Bielo, Executive Director
Susquehanna River Basin Commission

Water Quality is our topic for this second quarterly meeting. Our purposes are four-fold. First, the intent is to focus public and professional attention on a broad area of Commission concern -- water quality.

Second, develop improved awareness and understanding among the signatory members about each other's programs, problems, interests and perspectives about the issue of water quality in the basin.

Third, provide a basis for updating the Commission's Comprehensive Plan and gauging the accuracy and appropriateness of the SRBC staff's ongoing work program as regards water quality.

Fourth, but certainly not the least important, provide an opportunity for public participation. Clearly, none of our programs will proceed in an efficient manner without support by the general public. That support will come only if efforts are made to encourage and provide opportunities for effective public participation and just as importantly, public understanding of the many State and Federal programs.

As an example regarding understanding, we hope to bring some clarity to the current jargon of government that turns an ordinary conversation about water quality into a seemingly disjointed series of references to 201 grants, 208 schedules that are hampered by lack of 303e and 209 plans, delays in getting 401 certification, and of course, 92-500 is referred to as adding more confusion in Section 404 and so it goes...

While we can enjoy poking a bit of fun at the new language of government, water pollution control is serious, difficult and expensive business. The laws, the regulations and programs in this area must be comprehensible to government, to those being regulated and to the public who is affected by the success or failure of these programs.

To accomplish our purposes already described, we plan to set the stage for the overall program by quickly reviewing the important legislation that serves as the legal basis for water quality control actions and briefly summarizing the general status of water quality of the major streams in the basin. With this material as background, we will move on with the help of our several speakers to specific areas of discussion wherein

the roles of the involved Federal agencies such as the Corps of Engineers and EPA are described and clarified. We believe this is important as in recent years the Federal government has shifted from a passive to an active and even aggressive position in dealing with water pollution control matters.

Concurrently, state water pollution control efforts have been very greatly expanded through enactment of laws providing new authority to regulate and control water pollution, and through increased emphasis on stopping pollution before it happens through permit systems that require detailed review and consideration in advance of all new discharges to our streams.

The many water pollution control programs of the Federal and State agencies are so extensively interwoven in a complicated series of laws, regulations, procedures, permit systems, and funding plans that I suspect it is difficult for anyone to be fully conversant with them.

Within this new and complex framework of laws and regulations and programs are the industries and agencies that produce the discharges to our waters and thus become the ones that are regulated. To cover this area of concern, we have requested input today from two areas of the private industry sector. Within this same framework is the general public who needs ready accessibility to comprehensive information about progress and problems relative to achieving published water quality goals.

Adding to what has been said, it should be kept in mind that the SRBC Compact provides that the States shall have the primary responsibility for water quality management and control. The Commission's Comprehensive Plan and recently adopted Water Resources Program are reflective of that assignment of responsibility. However, approaching water quality management on a basinwide basis requires assurance that all responsible parties are aware of each other's programs, progress, problems and perspective on these problems and their potential solutions. It is also important that there is common agreement about priorities which will lead to consistent and complementary activities by each partner in the river basin.

Following each presentation time has been planned for comments from the Commissioners, and comments from the audience will be recognized also. Due to time limitations, however, written statements may be requested if the point becomes too lengthy. Written comments are invited also and should be submitted in a 30-day period after this meeting regarding any aspect of the overall program.

THE PAST TEN YEARS
IN
WATER QUALITY MANAGEMENT LEGISLATION

by
C. Peter Carlucci, Jr., Executive Assistant
Susquehanna River Basin Commission

Historical Background

The oldest Federal water pollution control measure is the Rivers and Harbors Act of 1899. Section 13 of this law, commonly called the "Refuse Act", prohibited the discharge of refuse other than liquids from streets and sewers into the navigable waters of the United States without a permit. Although enacted to protect navigation, the Supreme Court has held that the Act applied to pollutants regardless of the effect on navigation.

Another concern for pollution surfaced in the Public Health Service Act of 1921. The Act directed the Public Health Service to conduct research regarding the health aspects of water pollution. Under their leadership the plague of waterborne disease was eliminated.

The Water Pollution Control Act of 1948 was the first in a series of measures building the body of law dealing with water pollution culminating with the Federal Water Pollution Control Act Amendments of 1972; commonly referenced by its Public Law designation - P.L. 92-500.

The Changing Federal Role in Water Pollution Control Legislation

Federal legislation in the field of water pollution control has been keyed primarily to an important principle of public policy: The States shall lead the national effort to prevent, control and abate water pollution. As a corollary, the Federal role has been limited to support of, and assistance to, the States.

The 1948 legislation, for example, assigned powers for enforcement in water pollution control to Governors of the States. The Federal agencies were authorized only to support research in water pollution, projects in new technology, and give limited loans to assist the financing of wastewater treatment plants.

In 1956, the Congress approved major legislative changes in the water pollution control program. Federal grants were

authorized to assist States in preparing plans for pollution control and to help localities in building treatment plants. The authority for research and technical assistance was increased and broadened. Measures for controlling pollution of interstate waters were tightened.

The 1956 legislation called for increased cooperation between the Federal government and the States in order to develop a broader national effort against water pollution. The Federal funding authorized, however, fell short of needs. Meanwhile, pressures of population and economic growth upon the natural resources continued to increase.

In 1965 the Congress approved a second set of major legislative decisions for the water pollution control program. For the purpose of this presentation, perhaps the most important among these decisions were: the assignment of new responsibilities to the States; the continued use of the 1948 enforcement procedure; and the establishment of a new agency, the Federal Water Pollution Control Agency, to administer the Federal portion of the program.

Each State was required by the 1964 Act to develop standards for water quality within its boundaries. These standards were to be applied to all interstate navigable waters flowing through the State; intrastate waters were not included. The State standards were to be submitted to the new Federal agency by July 1, 1967, for approval.

The 1948 enforcement procedure provided for conferences and negotiations between dischargers of pollutants and officials of the government bodies involved. The procedure also permitted judicial review of the abatement conference recommendations. Further, a court could order abatement only after a finding that compliance with the order was feasible.

The FWPCA was established to administer the Federal portion of the program and placed organizationally in the U.S. Department of Health, Education and Welfare. During the past eight years, the agency and its authority have been transferred twice within the Executive Branch; in May 1966, to the Secretary of the Interior, and in December 1970, to the Environmental Protection Agency created by Executive order.

The Congress moved again in 1966 to broaden and intensify the Federal support of State efforts in water pollution control. A five-year authorization totaling $3.4 billion for grants to assist the construction of waste treatment plants was provided. The authorization scheduled $150 million for fiscal year 1967 and increased steadily during

the next five years to $1.25 billion for fiscal year 1971.

In 1970, the Congress confronted several specific problems in water pollution control. The 1970 amendments added to the basic law new sections on liability for cleaning up of oil discharges, discharge of hazardous substances, discharge of sewage from vessels, demonstration projects for cleaning up pollution in the Great Lakes, acid mine drainage, regulation of Federal activities affecting water quality, and manpower training for water pollution control.

On October 18, 1972, the Congress, over a Presidential veto, enacted Public Law 92-500. The Law enacted culminated two years of intense debate, negotiation and compromise, and resulted in the most assertive step in the history of national water pollution control activities.

The Federal Water Pollution Control Act Amendments of 1972

The Act departed in several ways from previous water pollution control legislation. It expanded the Federal role in water pollution control, increased the level of Federal funding for construction of publicly-owned waste treatment works, elevated planning to a new level of significance, opened new avenues for public participation and created a regulatory mechanism requiring uniform technology-based effluent standards, together with a national permit system for all point source dischargers as the means of enforcement.

The objective of the Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. In order to achieve this objective, it declared that:

"(1) it is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985;

(2) it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983;

(3) it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited;

(4) it is the national policy that Federal financial assistance be provided to construct publicly-

owned waste treatment works;

(5) it is the national policy that areawide waste treatment management planning processes be developed and implemented to assure adequate control of sources of pollutants in each State; and

(6) it is the national policy that a major research and demonstration effort be made to develop technology necessary to eliminate the discharge of pollutants into the navigable waters, waters of the contiguous zone, and the oceans."

The 1965 Act, as already noted, required water quality standards to be set as the control mechanism. States were to decide the uses of water to be protected, the kinds and amounts of pollutants to be permitted, the degree of pollution abatement to be required, and the time to be allowed a polluter for abatement.

Under P.L. 92-500, the basis of pollution prevention and elimination is the application of effluent limitations. Water quality is a measure of program effectiveness and performance, not a means of elimination and enforcement.

A two-phase program for applying effluent limits was created; the first based on best practicable technology, the second based on best available technology. Thus, unlike its predecessor program which permitted the discharge of certain amounts of pollutants, P.L. 92-500 makes it clear that no one has the right to pollute - that pollution continues because of technological limits, not because of any inherent right to use the waterways for the purpose of waste disposal.

Phase I, to be implemented by July 1, 1977, requires the application of the best practicable control technology for all point sources except publicly-owned treatment works. Publicly-owned treatment works must achieve effluent limitations based on secondary treatment by July 1, 1977. Phase II, to be implemented by July 1, 1983, requires all dischargers, except publicly-owned works, to utilize the best available technology economically achievable. Public works must achieve best practicable waste treatment technology over the life of the works.

Several sections of P.L. 92-500 will likely be the subject of discussion today, as they are also of the current review by the National Commission on Water Quality under Section 315 of the Act. The implementing sections of the Act's goals

and policies are:

Section 201 - Grants for Construction of Publicly-Owned Treatment Works

Earlier Federal Water Pollution Control Acts provided very little guidance to the waste treatment facility construction grant assistance program. The tremendously increased level of funding for construction required some policy direction to EPA in carrying out this program and to maximize the return on the public tax dollar. Federal assistance for the construction of waste treatment facilities requires that where appropriate, the best practicable technology is to be used, which shall include recycling of water, where practical.

Additionally, the section includes a procedure which requires that each applicant make an analysis of alternative waste treatment management schemes, with the burden upon the applicant to examine all available alternative waste management techniques. Beginning in fiscal year 1975, the Administrator of EPA must reject any construction grant application which would result in any discharge of pollutants, unless the applicant demonstrates to the Administrator that alternative waste treatment techniques have been considered, and that the proposal will result in the best practicable treatment.

Section 208 - Areawide Waste Treatment Management

The Governor of each State is required to designate each area within the State which, as a result of urban-industrial concentrations, or other factors, has substantial water quality control problems. In designating the boundaries of areas having substantial water quality control problems, the Governor is required to designate a single representative organization, capable of developing an effective areawide waste treatment management plan for the area. If a Governor fails to designate an area, the chief elected local officials within an area may designate the boundaries of the area and an organization capable of developing a management plan.

Within a year of designation, all such agencies are required to develop a waste treatment management plan to regulate all sources of pollution within a region consistent with Section 201. The plans must include the anticipated construction required to meet municipal and industrial waste treatment needs for 20 years, establishment of construction priorities, establishment of regulatory programs, and designation of agencies required to manage the program. When a plan is submitted to the Administrator of EPA for approval,

the Governor may include the name of one or more agencies capable of carrying out pollution control within the planning areas.

After a plan is approved by the Administrator, the Governor must annually certify revisions in conformance with basin plans, and provide an evaluation of the plan's effectiveness.

Section 209 - Basin Planning

This section requires the President, through the Water Resources Council, to require the preparation of comprehensive regional or river basin plans (Level B) for all areas of the nation by 1980. It was not intended to displace or duplicate existing river basin planning authorizations and agencies. While preparation of the plans required by this provision will be managed by the Council, the bulk of the funds authorized will be transferred to and utilized in the actual conduct of these studies by the Environmental Protection Agency, the Corps of Engineers, and other agencies having primary statutory responsibility for the preparation of plans for a given basin.

Section 303 - Water Quality Standards and Implementation Plans

Section 303 continues the use of water quality standards contained in the 1965 law. Existing standards are adopted both as to interstate and intrastate waters. In the case where such standards had not been adopted, they were required to be adopted within 180 days from the date of enactment. Provision is made for the revision of existing standards and the adoption of new ones in the future. Each State must identify waters for which effluent limitations are not stringent enough to meet the water quality standards, rank them by priority, and establish daily loads with seasonal variations.

Within 120 days of enactment the States were to submit for approval by the Administrator, a proposed continuing planning process consistent with subsection (e). These plans, prepared under 303e are required to include effluent limits, schedules of compliance, areawide waste treatment management plans, daily load limits, and adequate implementation controls over the disposition of residual waste and an inventory and ranking of needs for construction. The Administrator may not approve any State permit program under Section 402 unless it has an approved 303e planning process.

Section 401 - Certification

Any applicant for a Federal license or permit must provide the licensing agency with a certification from the State in which the discharge will occur that any such discharge will fully comply with all applicable standards and effluent limitations. The certification may also identify any other appropriate requirement of State law. The requirements must be included as conditions in any Federal issue. No license may be granted if certification has been denied.

Section 402 - National Pollution Discharge Elimination System

Permits now issued are under the National Pollution Discharge Elimination System (NPDES). Responsibility for administering the permit program established by P.L. 92-500 is shared jointly by EPA and the States. The NPDES permits may be issued by either EPA or the States under one of two procedures:

(1) the Federal procedure under which EPA issues NPDES permits after certification from the State in which the discharge will occur; or

(2) a state procedure, under which the state issues the NPDES permits under a program approved by EPA. In this procedure, EPA may veto the issuance of individual permits.

Section 404 - Permits for Dredged or Fill Material

This Section authorizes the Corps of Engineers to issue permits for the discharge of dredged or fill material into the waters of the United States. EPA may restrict the discharge of dredge material in specified sites if it determines that the discharge will have an unacceptable adverse impact on municipal water supplies, fishery resources or recreational areas.

The Federal Water Pollution Control Act Amendments of 1972 is one of the more complex pieces of environmental management and protection legislation ever enacted. There have been and continue to be significant issues in terms of administrative, coordination, timing, funding, etc. which will likely be the subject of remarks by some of the other speakers today.

State Responses to Federal Law

All of the signatory states made timely responses to

the Federal Water Quality Act of 1965. Maryland, Pennsylvania, and New York developed water quality standards for interstate streams by the July 1, 1967 deadline. They proceded to develop and adopt standards for their intrastate streams also, although this was not a requisite of the 1965 Act.

Under 92-500, Maryland was delegated the responsibility of administering the NPDES permit system under an agreement with EPA in September 1974. New York reached agreement with EPA to administer the system in April 1975. Pennsylvania is still negotiating with EPA. The States will be identifying their activities in response to various other sections of P.L. 92-500 later in the program.

Discussion

(Comment - Dr. Maurice K. Goddard)

A question came up that Pennsylvania isn't negotiating with EPA on the NPDES. We tried, but they wouldn't give it to us until we increased the penalties for violations to $10,000 and $25,000/day. The necessary State legislation passed the House of Representatives, but my guess is that it will not pass the State Senate. I've quarreled with EPA ever since they made this requirement because Pennsylvania has had the most agressive enforcement program perhaps in the nation. That's why I can't get the bill passed in the Senate because they think we really would apply $10,000 and $25,000/day fines. Therefore, it's hung up. With present budget restrictions, maybe it's a good thing it hasn't passed. Some States are backing away from not wanting the delegation because of financial problems.

(Comment - Dr. David Allee)

Many of the features of P.L. 92-500 were in place in New York long before they were in the Federal law. Part of the problem has been to adjust an ongoing program for many years that follows generally the same principles. Many adjustment details were difficult and thrashing these out has been a frustrating business, especially when sometimes you think you are being forced to reduce your standards rather than raise them.

(Comment - Dr. Maurice K. Goddard)

I think the thing that bothered us with the permit program was the fact that Pennsylvania issued permits for 25 years. Many states never issued permits until the Federal law was passed. New York and Maryland are doing the same thing.

PRESENT WATER QUALITY STATUS IN THE BASIN

by
Jerrald R. Hollowell, Chief
Resources Quality Management Protection
Susquehanna River Basin Commission

Introduction

The information for this report has been derived from the report, "Assessment of the Water Quality of Streams in the Susquehanna River Basin," just published by the Commission. The water quality assessment program is ongoing and the report is the initial assessment of the quality of the main stem and major tributaries based upon existing data. Annual supplements will report on staff assessments of special problems, stream surveys and update previous reports.

Susquehanna River - New York

The Susquehanna River in New York generally exhibits good water quality. High quality water is found in the headwaters from Otsego Lake downstream to Bainbridge. Nutrients increase moderately downstream from agricultural land runoff. Local degradation occurs during low flow periods in the Tioughnioga River below Cortland, in the Chenango River below Norwich, and in the Susquehanna River below Binghamton.

A waste treatment facility for the Town of Cortland is under construction which will eliminate the problem on the Tioughnioga River. Considerable improvement in the Susquehanna River below the Binghamton Metropolitan area has been noticed since the construction of the Johnson City-Binghamton primary sewage treatment plant. There remain problems related to storm water discharges and continued use of septic tanks in this area.

Chemung River

The Chemung River, a major northern tributary of the Susquehanna, is made up of three smaller rivers - Tioga, Canisteo, and Cohocton (Figure 1). Some headwaters, tributaries of these rivers, exhibit excellent water quality and support good trout fisheries. The Cohocton and the Canisteo Rivers carry significant discharges of treated wastes and receive nutrients from nonpoint sources.

Much of the Tioga River is severely degraded in Penn-

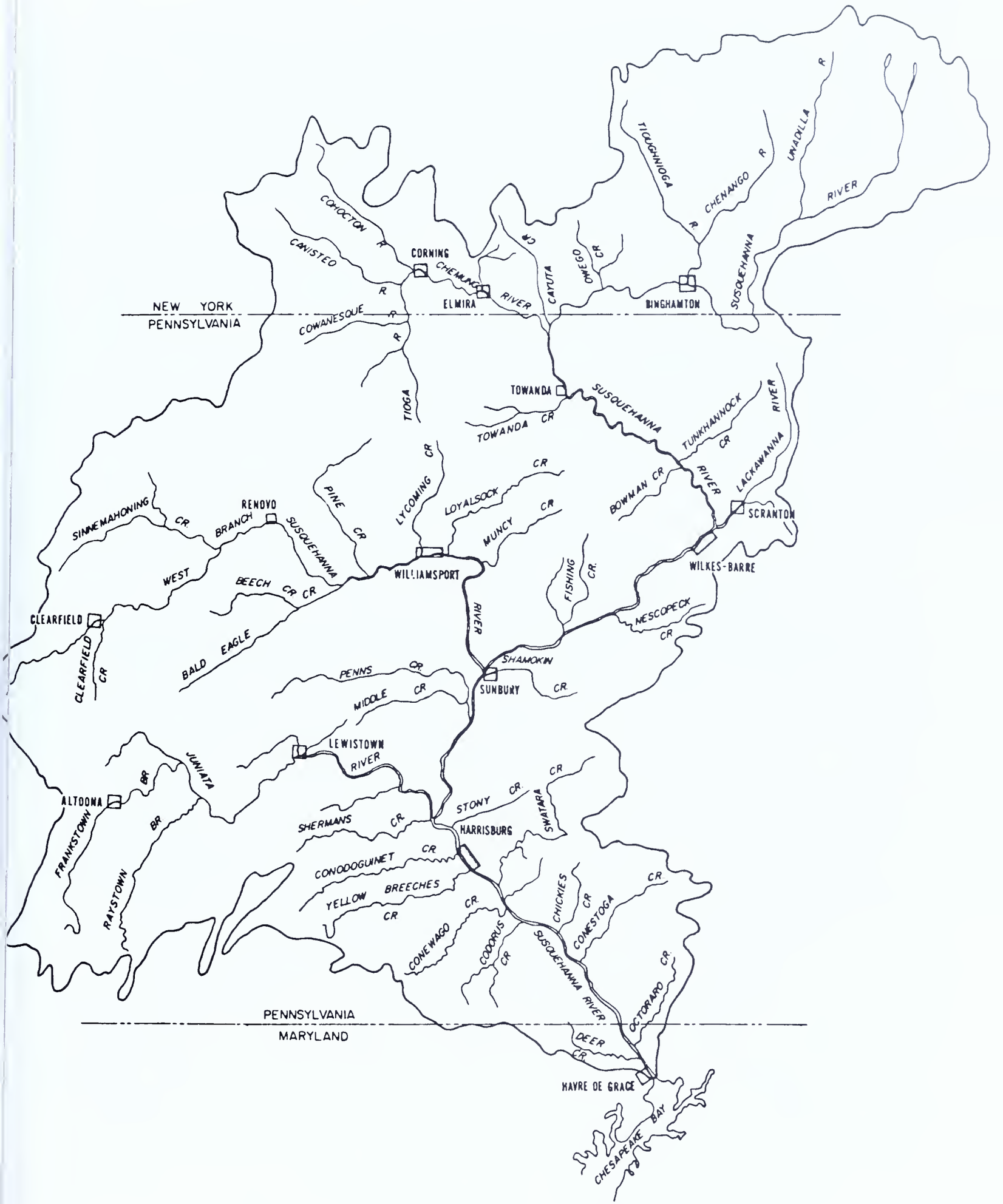

FIGURE 1. SUSQUEHANNA RIVER BASIN AND PRINCIPAL STREAMS

sylvania from overflows of abandoned coal mines in the headwaters near Blossburg. Reclamation measures in some affected tributaries funded by Pennsylvania DER and U.S. EPA have been undertaken. These measures consisted of surface reclamation and stream relocation. USGS personnel in cooperation with the SRBC are conducting flow and quality measurements to determine the amount of improvement realized by the State-Federal reclamation project. Recovery of the Tioga River begins near the Pennsylvania-New York border.

The Chemung River formed near Corning by these three tributaries receives further impact on its quality as it passes through the heavily developed areas of Corning and Elmira.

Although little data is available on the actual water quality impact of storm drainage within the lower Chemung River Basin, the area's steep hills and soils of poor water retention capability make it possible that storms add significantly to the region's water quality problems.

Susquehanna River, New York-Pennsylvania Border to Sunbury

The Susquehanna River from New York to the Wyoming Valley exhibits generally good quality water. From that point downstream to the confluence of the West Branch at Sunbury mine drainage and other discharges from the highly industrialized and urbanized Wyoming and Lackawanna Valleys degrade the river.

West Branch

The West Branch Susquehanna River exhibits the poorest water quality on a per square mile of drainage area basis. The western part of the drainage basin is underlain with large bituminous coal deposits. Coal mining activities which began in the mid-1800's and resulting abandoned mines now contribute about 800,000 pounds of acid per day (ppd).

Below Lock Haven the river water quality improves due to alkaline tributaries entering the river. Reduction of acid discharges from abandoned mines can be expected as a result of extensive DER reclamation.

Juniata River

The Juniata River exhibits high quality water throughout much of its drainage area. The northwestern part of the

Juniata River basin contains bituminous coal beds. Acid discharges from abandoned mines affects some streams in this area; however, the natural alkalinity is sufficient to protect major tributaries.

Organic pollution from Altoona, Huntingdon and Lewistown depresses the river's quality locally.

Susquehanna River - Lower Main Stem to Maryland

Water quality in the lower Susquehanna from the confluence of the West Branch at Sunbury to Havre de Grace, Maryland is generally good. Mine drainage and industrial discharges entering along the east side of the river exert some degrading influence downstream to Columbia. The Juniata River improves water quality along the west side of the river from its confluence downstream to Codorus Creek where some degradation occurs.

Below Columbia, three hydroelectric dams modify the river by creating reservoirs which act as sediment basins. In addition steam electric generating facilities in this river reach consume large amounts of water in their cooling processes.

Summary

In summary, the majority of surface and groundwater resources in the basin exhibit good natural water quality. Most of the over 2,600 miles of rivers and principal tributaries have high levels of dissolved oxygen as well as varied and extensive biological activity. There are, however, over 850 miles of surface water sources that are severely degraded, and many others that are affected to some degree by pollution.

Discussion

(Comment - Thomas C. H. Webster)
I think it's interesting to point out that according to a survey by EPA, the Susquehanna was listed as one of the ten cleanest rivers in the U.S. That's either good or bad depending upon how you want to look at it.

(Comment - Dr. Maurice K. Goddard)
If we didn't have acid mine drainage, it would have been superior. That's the biggest single problem. We are all working on the sewage problem, but acid mine drainage is a big culprit, primarily from abandoned deep mines.

EPA'S ROLE TOWARD IMPLEMENTING THE FEDERAL WATER POLLUTION CONTROL ACT IN THE SUSQUEHANNA RIVER BASIN

by*
Daniel J. Snyder, III, Regional Administrator
U.S. Environmental Protection Agency, Region III

It's a pleasure to be with you today and to participate in this program on water quality in the Susquehanna River Basin. I would like to talk about EPA's role towards implementing the Federal Water Pollution Control Act in the Susquehanna River Basin. Notice I didn't use P.L. 92-500 as of yet. I remember in the early days everything was letters, it was U.S.P.H.S., W.P.C.A., F.W.Q.A., and now it's all numbers as Mr. Bielo mentioned earlier.

I am amazed at the overall serenity I usually feel when I visit this river basin. Yet, shocked from what I have witnessed in this basin as a result of two major storms within three years. The direct damage alone from the June 1972 storm (Agnes) has been estimated at 2.5 billion dollars while the cost of the storm (Eloise) in September of 1975 may run close to a quarter of a billion dollars. The results of such storms may also have devastating effects on water quality and on the entire water environment for many years.

We in EPA feel that because of the past history of flooding in the basin and the continued potential in the basin for extensive flood damage, water supply and water quality problems may plague you for years to come. This history along with the fact that almost one-third of the basin's population is exposed to serious damage by a flood combining the most severe combination of meteorologic and hydrologic conditions, determines to a great degree, the major role this Commission must address, which is, a sound basinwide program of flood plain management and flood control. I am not here today to discuss your flood control program; however, we are concerned that maximum protection be given to water and sewage treatment facilities in the flood plain to protect the public against contaminated waters when flooding occurs. In EPA's emergency assistance to the Susquehanna Basin after the last two major floods, we determined the need for facility protection against water damage was critical throughout the flood zone. Under the Interim Primary Drinking Water Regulations, published in December of 1975, for P.L. 93-523 -- the Safe Drinking Water Act, it will be required that, except for intake structures, new or expanding water systems will avoid locating within the flood plain of a 100-year flood, or record of highest water

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* Presented by Edward V. Geismar, Basin Coordinator, EPA, Region III.

mark. This is a great step in the right direction -- away from the flood plain.

Before I get into that part of the program which reports to you what EPA is doing in the Susquehanna River Basin, I would like to remark on what I feel is this Commission's role in a water pollution control program. After the passage of P.L. 92-500, much confusion, concern, and consternation prevailed as to just what were the interstate type agencies going to do under P.L. 92-500? It was a black picture indeed at that time, but I am fully convinced now that the picture has changed. I believe the general feeling by most persons unaware of interstate activities and problems is to believe that all interstate agencies are the same and do the same things in the same way. In EPA, Region III, we have some seven major interstate agencies and each one I can say is very different in character, in philosophy, and in mode of operation to the other. This is, I believe, how it should be. Each agency doing what it knows best to assist the participating State-Federal members and local interests in their geographical sphere of concern. The Susquehanna River Basin Commission is probably the newest of all commissions and it was formed at a time when environmental regulations were accelerating between Jupiter and Mars. I know in those first days the Commission probably reviewed the existing Federal pollution control laws with concern and even more so after P.L. 92-500 became law. Well, we have had our indoctrination into 92-500 and I believe it has become pretty clear what the law expects from each of us. The law presents options to us and we are still confused in many areas as our responsibilities expand. However, it has been in these expanding responsibilities that we as members of a Commission find more and more need for Commission staff input to meet our responsibilities. The Commission itself knows and should know its basin characteristics better than anyone else and be the instrument to provide the interstate cooperation spoken of in law to prevent, reduce, and eliminate pollution between states. It is the responsibility of each state to utilize the forces of the Commission staff to develop those plans and requirements to attain the objective of P.L. 92-500. I believe we have begun to evidence this cooperative exchange between the areas of pollution control responsibilities and without wasted resources or duplication.

I would now like to report on the activities we in EPA find ourselves doing that enhance the Commission's role.

SRBC 106 Program

For the fiscal year of 1976, EPA has awarded the Susquehanna River Basin Commission under Section 106 of the Federal

Water Pollution Control Act P.L. 92-500, the amount of $68,600 while the non-Federal share was $117,638 for a total of $186,238. These funds are for the Commission to formulate and assist in a program for pollution control in the Susquehanna River Basin. While this amount is not large, the Commission can provide an assessment of interstate water quality elements essential to the development of the Federal and State regulatory programs and in turn, measure the impacts of the Federal and State programs on the water resources of the basin. It is important that the Commission continue their efforts in this area of establishing a solid data base, one that also recognizes the presence of those insidious chemicals which appear where and when we least suspect. I speak chiefly of those toxic substances, the inorganics and organics we are now and will continue to search out in our raw water and finished water supplies.

Of particular concern to EPA in our support of your program to control water pollution, is a continued effort on your part to collect and evaluate data relative to your major pollution problem -- that of acid mine drainage. This problem is closely aligned with nonpoint source pollution runoff in the Susquehanna Basin from the vast areas of open wounds on Pennsylvania, the strip mines. Nothing would please EPA more than to see this Commission be the instrument for restoring the destruction caused by strip mining. We know something is being done in this area but the problem is major to the Susquehanna River Basin and more must be done.*

Also, on the subject of nonpoint source pollution, we are vitally interested in its cause and effect relationship on the great Chesapeake Bay. This resource must be protected at all costs and we will not allow it to become another Lake Erie! The Susquehanna River Basin Commission has indicated in its 106 submission that "the lack of adequate data enabled only a guess assessment on nonpoint source pollution in the basin." EPA has made recommendations to assess the nonpoint source pollution from the Susquehanna River to the Chesapeake Bay and we are pleased this Commission plans to move ahead on this effort in FY-1976. We, in EPA, Region III will assist in your program to determine nutrient transport and accountability in the Lower Susquehanna River Basin.

SRBC - Water Quality Management Planning

New regulations covering water quality management planning under Sections 303(e) and 208 (P.L. 92-500) were promulgated by EPA in November, 1975. The new regs' establish policy and procedure for: a) grants under Section 208 to State and

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* (Ed. Note: See comment by Dr. Maurice K. Goddard following this presentation.)

designated areawide planning agencies, b) establishment of a continuing planning process including water quality standards reviews, and c) preparation of water quality management plans. (New regs' are contained in 40 CFR Parts 35, 130 and 131 published in the Federal Register on November 28, 1975.) The initial water quality management plans under development by the States (under Sec. 303e) are directed toward establishing point source effluent limitations to meet existing water quality standards. The Phase I plans are to be completed by July 1, 1976. During the next phase of planning, the States and designated areawide planning agencies must consider revisions to water quality standards to meet the 1983 goals of fishable and swimmable waters, whereever attainable. More attention will be directed toward the development of best management practices for control of nonpoint source pollutants. This, in addition to more refined point source control plans, will comprise the basic elements of the Phase II plans which are to be completed by November, 1978.

The States will be looking toward the SRBC to assist them in the continuing planning process. Specific areas where SRBC may provide assistance include: a) the assessment of nonpoint source pollution problems and the development of best management practices for their control, and b) interstate coordination of planning, particularly the water quality standard reviews. Formal agreements for planning assistance between states/local agencies/SRBC should be completed by May, 1976.

SRBC - Surveillance and Analysis

In this area, our concerns in the Susquehanna River Basin relate to what we believe are the major pollution problems from mine drainage, nonpoint source pollutants (chiefly nutrients) and hazardous substances. We believe there is a need for more thorough monitoring for and consideration of trace amounts of hazardous substances in the basins' waters. A review of an Upper Bay Survey of the Chesapeake Estuary revealed some pertinent findings relative to PCB's. The subject report concludes that the Susquehanna River is the major source of chlorinated hydrocarbons (CHC's) found in the Upper Chesapeake Bay. This includes PCB's, Chlordane and DDT residues. These CHC's were transported throughout the Upper Bay attached to suspended sediments in the water column. A few samples of Chesapeake Bay striped bass eggs analyzed for CHC's has shown to contain high levels of PCB's. The problem again is the food chain of life; the chlorinated hydrocarbons absorbed on fine sediment particles are stripped off when ingested along with the phytoplankton by grazing organisms or by the sessile filter feeders (oysters and clams). The grazing organisms are

eaten by predators such as fish, which in turn are eaten by man (who also eats the shellfish).

We do not know the seriousness of the problem, but others also did not know the seriousness of the problem in the Great Lakes and the Hudson River. Further study is required of this potential problem and we ask the Commission in their development of a solid base of water quality to recognize the presence of these hazardous substances. As a final comment, we wish to emphasize the importance on monitoring assurance. It is important that the information you provide is accurate for all uses in the Federal, State, interstate program to abate pollution. Again, EPA, Region III is ready to work with you to achieve monitoring quality assurance.

SRBC - Water Supply Program

Water Supply - Three major communities in the SRBC are classified as interstate water carriers in EPA, Region III. These communities are Scranton, Wilkes-Barre and Harrisburg. As an interstate water carrier, the finished water product is reviewed and evaluated against public health safety standards. EPA, Region III is now planning for 1976, a regional survey and search for the presence of specific organic compounds beginning with carbon tetrachloride and chloroform; the three communities mentioned will be included in this regional survey.

EPA has recently published final interim regulations designated to help safe-guard the nation's public drinking water supplies. These regulations are expected to become effective in June of 1977. In the Susquehanna River Basin, approximately 2,200,000 residents out of a population of about 3,600,000 are served by some 440 public water suppliers. Certainly, many existing water suppliers will be faced with upgrading their present systems and in the case of small systems the economic impact could be severe. EPA will continue to evaluate this situation as more economic data becomes available, and may modify these regulations accordingly prior to their effective date.

SRBC - Environmental Impacts

In the environmental impact area and relative to our responsibilities in the Susquehanna River Basin, we are most concerned with how Section 404 of the Federal Water Pollution Control Act will be implemented; that is, implementation of the Corps/EPA guidelines on this subject. I have been informed final phase of jurisdictional responsibility will include all tributaries to headwaters, all adjoining or adjacent

wetlands, all natural ponds or lakes over five surface acres and all man-made impoundments that retain/discharge more than 5 cfs. Actions that will require Federal (COE) permits are any that would displace water, or wetlands, with any pollutant as defined in the guidelines. For all practical purposes, this could be any foreign solid, or combination of solids. We are in close coordination with the Corps of Engineers and DOI's Fish and Wildlife Service in an effort to identify areas of concern and possible types of general permits that can be issued in furthering the Section 404 program. Certainly, implementation of Section 404 will strain our resources, however, we hope a reasonable implementation program can be developed in the Susquehanna River Basin with the assistance of the Commission staff.

In other areas of EIS review, we are continuing our assessment of those projects that require a Federal involvement and in particular, Corps of Engineers flood control projects and acid mine abatement studies such as in the Tioga River Basin.

SRBC - Permits - Enforcement Research and Development

At this moment the permit program (NPDES) for dischargers within the Susquehanna River Basin appears to be running true to course, with any problems local to tributaries to the Susquehanna from coal mining operations and from inadequate waste treatment facilities. I am unaware of any major enforcement actions in the Susquehanna River as of this date.

Conclusion

Before I close, one other item that EPA is participating in, in the Susquehanna Basin, is the 201 or facility planning area of sewage treatment construction. We have divided the Susquehanna River Basin area into three major regions: Wilkes-Barre; Williamsport; and Harrisburg. In fiscal years 1975 and 1976 we had approximately 47 projects on the priority list for consideration with the majority being in the Harrisburg region. The largest project is upgrading Carlisle facility with the Federal cost-share in this project close to $17 million, when approved. EPA this year will emphasize getting out as many projects as possible throughout our region. In conclusion, I believe these are the basic elements of our program and its relationship to the Susquehanna River Basin Commission. I would like to emphasize one comment made about the aggressiveness of EPA under the present law. The aggressiveness of the EPA is true. We are very aggressive and we intend to be aggressive, but it must be remembered that the aggressiveness is

geared and aimed at making the States and interstate agencies the primary agencies to carry on the program of P.L. 92-500 for the future.

Discussion

(Comment - Dr. Maurice K. Goddard)

One point I'd like to correct in your talk about the destruction of the waters of the Susquehanna Basin because of strip mines. I think the record will show that most of the destruction of water is from deep mining -- the whole Wyoming Valley and almost all the West Branch. That doesn't say that we don't have troubles from strip mining, but I think our records indicate something like 85 percent of the 800,000 ppd that we talked about comes from abandoned deep mines, so I think you might like to make a note of that, because I don't think it would be fair to publish it the way it is.

(Comment - Mr. Thomas C. H. Webster)

I would like elaboration on your recommendation that the Commission become involved in the restoration of strip mines. Did I hear you correctly? That's a State program, not a Commission program and it's certainly one that we would endorse and support; but I don't feel that it's a prerogative of this Commission to usurp the ongoing program of the Commonwealth of Pennsylvania.

(Comment - Mr. Edward Geismar)

Yes, you heard me correctly. I think the Commission will have to look into it, and work with the States in the types of programs that are necessary for the restoration of the strip mines.

(Comment - Dr. Maurice K. Goddard)

They might make recommendations, but not do the physical work.

(Comment - Dr. David Allee)

How much money are we spending currently on mine reclamation in dealing with this problem overall? I'm just looking for a general order of magnitude, and how much is Federal money?

(Comment - Dr. Maurice K. Goddard)

In Pennsylvania, I think we've already spent (not in this basin alone) about $94 million, and that's all State money.

(Comment - Dr. David Allee)
Well, what about Federal money, how much are we spending there?

(Comment - Mr. Edward Geismar)
The course is not to have the Federal government involved in the reclamation of strip mining. Federal money will go into it, of course.

(Comment - Dr. David Allee)
Pennsylvania coal was used to start the industrial revolution in the United States. Here we are in the bicentennial year and I think it's time we took a look at some of these things.

(Comment - Mr. Thomas C. H. Webster)
The Advisor to the New York State member is trying to get a little more money out of the Federal government!

(Comment - Dr. Maurice K. Goddard)
We should back up a minute. We are getting Federal monies to help with certain types of mine restoration work, primarily in flushing of deep mining. In the Scranton area, the Department of Environmental Resources is doing about $11 million in flushing of deep mines under the Scranton metropolitan area. Seventy-five percent of that money is coming from the Appalachian Regional Commission. Twenty-five percent is coming from DER.

(Comment - Mr. Edward Geismar)
It appears over the years we really haven't hit on good answers for doing the job.

(Comment - Dr. Maurice K. Goddard)
Well, we know the answers, but it takes a lot of money. We have a study made in the Department of what it would take to restore all the anthracite strip pits. 1970 dollars are about one billion. That's why I get provoked when I can't make my western friends understand why they need a strip mine law. Just in the anthracite region alone, and we're not getting very much of the acid discharge out of those strip mines, but just to restore them to contour would cost about one billion dollars. That's the hang-up. Here we are spending about $200 million in the State. We have had as many as 46 contracts going at one time. It's going to take a tremendous amount of money to restore the damages done by pre-act mining in this Commonwealth. This applies to the other 25 states that mine coal, too. I

think a lot of people don't realize there are 26 states in the nation that have acid discharges. Some come from copper mines, most of them from coal mines. So 26 states are affected in some way by discharges of acid waters from mining. It's not a traditionally Pennsylvania problem, it affects all of us now. With the new laws we hope we are preventing it in the future. I don't think that we'll ever reclaim every area that's been damaged in the past. I would hope that we would reduce it enough that you get some dilution effect as we have on the Raystown Branch. The Raystown Reservoir is a good reservoir in spite of the fact it gets a little bit of acid mine discharge. Whether we should go and spend a huge sum of money to cut out that discharge into the reservoir is something we should evaluate carefully.

(Comment - Mr. Edward Geismar)

If you ever need any Philadelphia sludge to help restore the strip mines ....

(Comment - Dr. Maurice K. Goddard)

We're not talking about the surface, we're just talking about putting the materials back to restore them to contour.

(Comment - Dr. David Allee)

Now can I press this point a little bit further? You mentioned that substantial amounts of Federal funding are coming through the Appalachian Regional Commission. I would like to point out relative to some remarks that we made before, that the Appalachian Regional Commission is another case where the Governors have banded together to deal with problems common to their states and in many cases common to parts of their states which, face it -- don't have a whole lot of political clout, but together have considerable ability to encourage the movement of Federal funds. As a matter of fact, that is a region which, directly as a result of the Appalachian Regional Commission, has gone from receiving less per capita aid from the Federal government than the rest of the nation on the average, to more than the average, even though it's recognized as one of our poorest regions. Up until the time we had that Commission, it was lagging behind in that area. I suggest we look with care at the track record of the Appalachian Regional Commission as we look ahead at what this Commission might do.

(Comment - Mr. Thomas C. H. Webster)

Mr. Geismar, you made reference to the Susquehanna River Basin Commission as an enforcement agency. I think we've been very clear in all our deliberations that we did not want to place

this Commission in an enforcement role. Maybe I misunderstood the comment, but I just want to reinforce that particular statement, that what we do is to act in a coordinating capacity. My last point is on Carlisle and upgrading their sewage plant, which has been long overdue. Isn't that being built on the flood plain?

(Comment - Mr. Edward Geismar)
A lot of sewage treatment plants are still being built on the flood plain.

(Comment - Dr. Maurice K. Goddard)
It hasn't been built yet. They haven't granted the money yet.

(Comment - Mr. Edward Geismar)
Unfortunately, that's true. We still have treatment plants being built on the flood plain.

(Comment - Mr. Thomas C. H. Webster)
Do you require them to be floodproofed?

(Comment - Mr. Edward Geismar)
Yes, that's one of the considerations we now take into account. Made as floodproof as possible if they are on the flood plain. As I mentioned earlier under the new Drinking Water Law it will be very difficult to build something in the flood plain.

(Comment - Mr. Jack Carling)
Early in your presentation, you assign much of the water quality problems in the basin to flood prone facilities. It would seem that a national flood plain management program is a dire necessity. Do you see an EPA role at all in helping that happen?

(Comment - Mr. Edward Geismar)
Well, I think we are helping in the way that we're requiring the construction of sewers and water treatment plants and in our impact reviews of each project. It will have a definite effect in the management program in the overall development of the flood plain.

(Comment - Dr. Maurice K. Goddard)
Like Mr. Carling, I don't think they'll have a role as to who builds or who doesn't build in the flood plain. They (EPA)

won't have that role. They can regulate what the sewer plant would be like on the flood plain.

(Comment - Mr. Edward Geismar)
That's right. The regulations for structures, ... they're going to be built in the flood plain, would be very severe.

(Comment - Mr. Thomas C. H. Webster)
I would also like to point out that I feel it is totally irresponsible for the legislature in the Commonwealth of Pennsylvania, given Eloise, given Agnes, and given the high incidence of flooding, not to take positive action on flood plain management in this State. Absolutely inexcusable, and I think any legislator that stands in the way of a program of that nature is irresponsible and not performing his job as he was elected.

(Comment - Dr. Maurice K. Goddard)
The Senate finally passed the final version of Senate Bill No. 1 31-18 and it now rests in the House of Representatives.

(Comment - Dr. David Allee)
I want to check on the Drinking Water Act because it relates closely to water quality issues. There is a requirement for EPA to perform a survey of rural drinking water problems. I suspect that that is a major problem in this basin, but it's one that is third or fourth priority and we're still dealing with first and second priority problems.

(Comment - Mr. Edward Geismar)
When you say rural, do you mean from well supplies?

(Comment - Dr. David Allee)
Well supplies, correct, and the adequacy not only in a quality sense, but also in a quantity sense for rural residents. Not only those that might live in a community serviced by a common system but those that are scattered around and where it may not be feasible for service with a common system. This survey could potentially mean quite a bit to this Commission: the way in which it is carried out; the kind of findings and so on would be something that we might want to respond to. I wonder if other regions have been involved in it yet?

(Comment - Mr. Edward Geismar)
It's so early in the program for surveys. We are just

laying the groundwork. We have one program coming soon in which we will analyze 110 specific water companies, water suppliers, but they are on a larger scale, not on a rural type scale at this time. But it certainly is intended to do this, as you say, and we will get around to that eventually.

(Comment - Dr. Maurice K. Goddard)
Would hope that EPA would hold to the status-quo for a couple of years. Don't give us any new rules and regulations so we can get our 208 plan and our 303e plan underway. I'm not criticizing you, don't misunderstand me.

(Comment - Mr. Edward Geismar)
It's been very trying, to say the least, in the last few years, but I firmly believe that we are coming out of it. I think we have established the groundwork and can move ahead now.

(Comment - Dr. Maurice K. Goddard)
Well, we all agree with that and we all argued that we shouldn't put those dates in and that type of thing. Would you hazard a guess what you might anticipate Congress to do in amending that Act? Obviously, we're not going to meet that secondary level of treatment goal by 1977. I think it's better for Congress to change that law than to have hundreds of municipalities across this nation in violation of the law.

(Comment - Mr. Edward Geismar)
Right, basically, our opinion on some of these points is that EPA favors consideration of extending the 1977 date generally on a case-by-case basis.

(Comment - Dr. Maurice K. Goddard)
Are you going to go that far? It's going to put an awful lot of work on you.

We appreciate the terrible burden on EPA and its tough burden on all the other people who work in this field. Anything we can do to make it flow better among all of us will be a needed improvement. It's to the public's advantage.

(Comment - Mr. Edward Geismar)
Yes, well, I don't think it's going to be too bad. We certainly favor retaining the 75-25 cost-share ratio. We favor certain facets of the so-called Cleveland-Wright Bill. We favor increasing the state role in this management program. EPA is generally against restricting the type of project that is disallowing the collection systems. Certainly, we feel that should be part of the grant as anything else.

U.S. ARMY CORPS OF ENGINEERS' ROLE TOWARD IMPLEMENTING THE FEDERAL WATER POLLUTION CONTROL ACT IN THE SUSQUEHANNA RIVER BASIN

by
Colonel Robert S. McGarry, District Engineer
Baltimore District, U.S. Army Corps of Engineers

Introduction

Our traditional mission in the Corps has been in flood control and navigation, but under the laws discussed by Mr. Carlucci, we've been required to give more emphasis on water quality and water quality management. We welcome this opportunity. Our programs now are (more than they were in the past) devoted to the whole water resources program. Today, I would like to talk to you about four major activities of the Corps in the basin. Our planning activities, the effect of some of our construction activities on water quality, the operation of the existing reservoir system (how we do it, what we would like to improve) for water quality management and last but not least explain how we are implementing our increased 404 jurisdiction that has been talked so much about.

Planning Activities

In the area of the planning, we have two studies nearing completion. One of them was talked about quite a bit previously and another one not quite so much. I'll cover the last one first, our Binghamton Wastewater Management Study. The Corps was given the authority by Congress to conduct a study, purely a study that there will be no construction program as a result of it, for the Binghamton region. This work was actually done under the authority of the Susquehanna Review Study that was underway and the goal was to assist these communities to protect and improve the water resources. Within Broome and Tioga Counties in New York the study emphasis is on the more urbanized section of the Susquehanna and Chenango Rivers in the Binghamton area. These two rivers are the major source of water in this area and there is a need to protect and keep the quality continually improving.

The purpose of our study, as authorized by Congress, was to develop a comprehensive wastewater management plan enhancing water quality in the Binghamton area. Our first finding was that the existing water quality conditions in this area of study were good, because of New York DEC's financing of construction

of sewage treatment plants. Needed plants are either constructed or under construction. The problem is to maintain the existing high water quality. Second, there is a need to eliminate overflows from the combined sewer system. Third, as the population grows there will be a need to maintain the water quality as it exists. There is also a need to provide treatment for some areas that are developing in the region that don't have sewage treatment now. The water resources are a part of a recreational/scenic program and so any water resource plan should take that into account. Sludge handling is a problem in the Binghamton-Johnson City area and the control of infiltration is also a problem. And last, but not least, the communities are faced with the requirement, as discussed earlier, to comply with P.L. 92-500, namely: by '77 secondary treatment; by '83 fishable-swimmable waters; and by '85 no discharge of pollutants.

The study was conducted by the Corps in that we were the manager of the funds and provided leadership. I would like to emphasize at this point, that this was indeed an interagency (Federal, non-Federal, Basin Commission) study with strong input from the public from start to finish. I don't even like to call it a Corps study - it was a combined effort by everyone concerned with water quality.

We started with a series of 40 strategies, discussed at a public meeting. These 40 strategies were narrowed down to 13 alternatives, investigated further, and finally with public consensus, our advisory group consensus, and an all agency consensus, we narrowed down to four specific plans to examine in detail. These four plans, that are most appropriate for the region were: a base line or "do nothing" plan; second, a plan we titled "Secondary Plan" to provide secondary treatment for the region. This complies with the 1977 goal of P.L. 92-500. A third alternative would be "Secondary With Nitrification" in the Binghamton-Johnson City area which would bring the region in compliance with the 1983 goal and last, an "Advance Waste Treatment" alternative which would meet the 1985 goal. The consensus of all involved was to recommend the adoption of the "Secondary Plan" because it's flexible; it's efficient in that it's the least cost but meets the requirements of P.L. 92-500; and last but not least, it was accepted completely at the public meetings that we held.

We have submitted our recommendations to a joint meeting of the two county legislatures in the area and at this point we are wrapping up the study. It will be up to counties to adopt the plan, apply for necessary grants and approvals, and proceed to implement. We have completed our role which was a planning role. I would like to point out that in this study the citizens advisory group, in my opinion, significantly contributed to the study. I am now confident that we can really

get citizen involvement in a complicated thing such as wastewater management. These people had good leadership. They did their homework and learned the laws and terms that we in the business throw around so much. They contributed significantly to the program. Their recommendations were good and solid and they were right with us when we presented to the legislature and were able to assure their legislators, "We feel you have citizen approval of this so you can go ahead with it."

Our planning activities in acid mine abatement has been discussed quite a bit here. We have been authorized by Congress to study the problem and hopefully do something about it. The objective of the mine abatement study is to determine the extent and the magnitude of the problem, to investigate possible solutions, and determine the feasibility of adopting abatement measures. I would like to emphasize, we've been asked to define the problem, look at solutions and make a recommendation on how to go about correcting it. As has been stated, there are two sources of acid in the basin; active mines (either strip or deep mines) and abandoned mines. I would emphasize that we feel that the responsibility for controlling active mines rests with the owner through existing laws. The problem is, therefore, abandoned mines, either strip mines or deep mines. The coal was taken many years ago and used for the whole U.S. The present owners of property, of course, are not able to abate the acid and the question is how to abate the acid from abandoned mines.

Our studies to date indicate that there are two general methods of acid abatement from abandoned mines. One we call preventive measures, such as restoration of a strip mine. The advantages of this approach are that there is low maintenance and operating costs after you finish, but the disadvantage is that preventive measures tend to be more expensive initially. Another alternative is the treatment of water where you can get at it. The process is fairly simple. The initial costs are somewhat lower, but the problem of continual operation and maintenance forever faces somebody. I would like to emphasize again that we feel the major water quality problem is abandoned mines both in Pennsylvania and Maryland.

I've had discussions with Mr. Dan Snyder (of EPA) about more active enforcement of our laws that are on the books to control the acid discharge from active mines and I think we are both in agreement that it can be done. Therefore, the active mines are not part of our study.

To date, we've completed work in one basin, the Tioga Basin. The basin, near Blossburg, Pennsylvania has been degraded for years. The problems come from both strip mines and abandoned

mines. It's a good area to study, in a way, because the problem is well defined. The acid affects a long stretch of the river and it affects both Federal and non-Federal interests because our Tioga-Hammond Reservoir will be impacted as well as State and local regions. We've looked at five different alternatives and have recommended a combination of preventive and treatment measures for this basin. Some work on the stream channels, some stream diversion, some reclamation and restoration of strip mines and the construction of two plants to treat acid mine drainage.

The plan would reduce the acid discharges and provide better habitat for the fish. It will eliminate the "yellow boy" and, of course, provide cleaner water. We finished this subbasin as part of the total study of the Susquehanna River Basin. Our recommendations are at the Washington level at this time. They are there not so much for a review of how to correct the situation but to establish Federal policies about the problem.

The policy matters that have to be decided; first - are we going to clean up acid mine drainage? It has not been established as a nationwide program. Second, if we're going to do so, what is the Federal role? Will the Federal government contribute any or all of the costs and if it's going to be contribution, how much? Having established that there is a Federal role then we should establish how do we go about doing it? Will it be a grant system such as the EPA sewage treatment plant program or will it be construction by Federal agencies? If by a Federal agency, which agency, and to me a most important issue. If you're going to do this, how are we going to decide which projects to do? Our initial analysis says that we can not use traditional Corps cost-benefit methods. You can't justify an abatement project on a cost-benefit basis, but can counter that with an argument that we don't justify sewage treatment plants and other water quality plants on a cost-benefit basis. Once we establish the policy that it's necessary to be cleaned up; therefore, it should be cleaned up. That issue has to be resolved.

Last but not least, I mention the problem of operation and maintenance. If you need treatment plants, who is going to operate and maintain them? In this region neither the State or Federal government are traditionally operators of treatment plants. It's usually a county or a city responsibility. In my discussions with Dr. Goddard on the Federal and State role, we both expressed a reluctance to get into the business of operating a plant because we're both aware of how difficult it is to get people and money to operate things after you have them. These are issues that we have forwarded to Washington. They are being worked on. I would hope that they would be resolved for the

Tioga Basin, so we can complete our work there and the rest of the Susquehanna Basin. We have similar programs for the Potomac River in Maryland with the same set of problems. I hope the Tioga Basin will lead the way for a Federal policy.

Construction Activities Affecting Water Quality

Some of our construction activities and projects underway we feel will contribute to improved water quality. At Tioga-Hammond, we have the acid problem. Tioga Creek has acid runoff, as I mentioned earlier, whereas Hammond Creek is clean water. They are being impounded by two reservoirs and here we see a picture of the construction of the connecting channel between the two reservoirs that will enable us to mix the alkaline water from the Hammond with the acid water from the Tioga and improve water quality downstream. By selective discharge, we hope to improve the quality of the water downstream. Upstream of the Tioga Lake (until we get the abatement measures that I spoke of earlier) Tioga Creek is quite acidic and it will limit our recreation capability on Tioga Lake. Cowanesque Dam controls the Cowanesque River that flows into the river, downstream from Tioga-Hammond. We will store alkaline water in Cowanesque and by combining our releases from Cowanesque with the Tioga-Hammond Lake will get a better quality of water.

We also have, in the basin, many reservoirs in existence. We operate them during nonpeak flood periods for water quality. For example, at Raystown Lake, we built the project so we have the capability of releasing water to control sediment, turbidity and nutrients downstream. A rather expensive release structure is required, but we think it is worth it. We are also confident we'll maintain high quality recreational water behind the reservoir.

Operation of Existing Reservoirs as Related to Water Quality Problems

I would like to talk a little bit about the West Branch where there is a serious acid problem. We control four reservoirs on the West Branch, three built by the Corps and George B. Stevenson built by the State. The West Branch is degraded by acid and fish kills near Lock Haven occur because of acid slugs. The problem comes mainly from the Curwensville area especially during the summer low flow period. We are operating these reservoirs, Sayres, Curwensville and others during periods of low flow to improve the quality downstream and at the same time maintain the quality in our lakes. This control is accomplished by my staff based on slow, manual computations. Our research has indicated that we could do a much better job with a compu-

ter supported program. I think I've got the money to develop the computer programs and we're going to go ahead and do it. I hope to have it in operation by mid-to-late summer this year. This will allow us to operate these four reservoirs as a system with computer control to provide the highest quality water downstream and at the same time maintain our recreation lake.

Implementing the Section 404 Program

I would like to talk about the famous Section 404 jurisdiction now. As Mr. Carlucci mentioned, our regulatory functions go back to 1899 and were originally aimed at keeping the navigable waters navigable. A Corps permit was required for structures and for fill and excavation in navigable waters. P.L. 92-500 retained to the Corps, the authority to issue permits for dredge and fill material, which is considered a pollutant. For dredge and fill operations we must issue a public notice and provide an opportunity for hearings. Guidelines that were developed by EPA and the Corps are used to evaluate requests.

Until about a year ago, we restricted our authority to navigable water, waters that have been, are, or will be used for navigation. In the Susquehanna Basin that means up to Athens and on the West Branch as far as Lock Haven. Also a few miles of Codorus Creek are deemed navigable. In March of 1975, a Federal judge ruled that our regulations should be applied to all of the waters of the U.S. We are moving forward to do that in three phases.*

Phase I, effective July 25, 1975, extended our jurisdiction to the wetlands that are adjacent to the traditional navigable waters. In the Susquehanna Basin this change did not expand our jurisdiction very much. In the Chesapeake Bay it did and brought us into agreement with Maryland's definition of wetlands. Here I feel a little more comfortable because Maryland and the Corps are now using the same set of rules in determining what we regulate.

Phase II which becomes effective the first of July, 1976 extends our jurisdiction of the navigable waterways to the major tributaries of the navigable waters. In the basin it means we pick up Codorus Creek, the entire Susquehanna River, the Chenango and all the tributaries of those, and any discharge or fill in those waters will require a permit from the Corps effective the first of July. For people and agencies planning activities that won't be completed before the first of July, we are accepting permits and processing them to avoid hitting you the first of July right in the middle of the project.

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* (Ed. Note: See Appendix A.)

One year later, July 1977, in Phase III, we pick up tributaries to the tributaries under 404. That takes in just about all the water. There will be some exceptions that I'll mention in just a moment. The construction of dams or dikes, placement of erosion control measures such as rip-rap, backfill or bulkheads or revetments along a stream, bridge abutments and causeways now require Corps permits. All the townships, counties, States, Federal highway people and the Corps are now very much in business together. Going back to dams and dikes, for example, the Soil Conservation Service reservoirs will now need a permit from the Corps. Backfilling for outfall or intake structures will require a permit from the Corps. Almost any construction that takes place in the waters in the basin requires a permit. The exemptions are: normal agriculture and silviculture, such as plowing, seeding and sowing are exempted. Stock watering ponds less than five acres surface area, and lakes less than five acres are exempted. Areas where the stream flow is less than five cubic feet per second on the average (that means where you can jump across it) are exempt. Emergency repairs to dams, dikes, culverts are exempt.

One of the things in the Corps' regulations to cut down on the paper work is a new concept called general permits. The reason for general permits is to try to avoid interferring with the everyday life and with things that are non-controversial. The District Engineer has the authority to issue a general permit that authorizes certain non-controversial, non-environmentally-damaging activities. When a general permit has been issued certain activities covered by the general permit are authorized and a request from the Corps is not necessary. An example, though not too applicable here in the basin, is a general permit for mooring buoys in front of private property on the Chesapeake Bay. Literally thousands of mooring buoys are installed in the bay and we didn't want to process each buoy. So we're issuing a general permit so that if you own property and you want to put a buoy in front of it and it's not in the navigational channel and a couple of other restrictions, it's permitted. We are working with the State and Federal agencies looking at other general permits such as highway maintenance, small culverts and bridges, perhaps docks (what we call Mom and Pop docks) along the Susquehanna River and other similar non-controversial activities. Prior to issuing general permits, we will have full discussion and have public hearings. The key note is that they have to be non-controversial, non-environmental. We hope to cut down on a great deal of paperwork.

In summary, we in the Corps look at the basin as a very valuable resource. We have ongoing programs in planning, construction, operation and our permit program. I have brought hand-outs today and they are on the back table. I have a hand-out describing our Binghamton Wastewater Study, the Tioga Creek

Mine Abatement Study and I have quite a few hand-outs on Section 404 permit activities including a copy of the Federal regulation. If you have any trouble sleeping at night I recommend you take that Federal regulation home and read it, it works wonders.

Our interest goes far beyond flood control and navigation. We are very much into the water quality business and look forward to our continual relationship with the Basin Commission and you people.

Discussion

(Comment - Dr. Maurice K. Goddard)
On policy decisions being down at the Washington level on helping clean-up of acid mine drainage; when you say it's in Washington, can you tell us where it is in Washington?

(Comment - Col. Robert S. McGarry)
The Chief of Engineer's office.

(Comment - Dr. Maurice K. Goddard)
Can we have some input from the Commission or State agency into that decision-making process? It (acid mine drainage) affects 26 states, it isn't something unique to the Susquehanna River Basin or the Potomac.

(Comment - Col. Robert S. McGarry)
I think it would be very appropriate for the Basin Commission or the States to make their views known on those issues to the Chief of Engineers or to my office and we will pass them on. I have been advised there is a possibility that some legislation will be included in the next Omnibus Bill this spring. The Act may authorize the construction by the Federal government of a prototype mine abatement project. I'm watching this very closely. As soon as it hits the Public Works Committee, I'll send you a copy because I think again it would be very appropriate for you to comment. Congress is interested in acid mine abatement.

(Comment - Dr. David Allee)
I think New York, as a State that used a lot of that coal and now receives some of that water, ought to be interested in supporting a position that this Commission takes; not necessarily a definitive answer to each question, but at least forwarding something to the Chief's office; Secretary of the

Army's office; OMB and later Congress. Certainly the Commission ought to have some words of wisdom to pass on to their deliberations.

(Comment - Dr. Maurice K. Goddard)
I concur and along with the rest of the Commissioners ask the staff to put together a recommendation for us for discussion in February. I think it's inappropriate to act on anything today, but I think if we did it in February, it would be in time to help influence any decision-making process at the Federal level. I think it would be appropriate for us to do that.

(Comment - Mr. Paul McKee)
Colonel, can you give us a status report on the possible delegation of authority to States under Section 404?

(Comment - Col. Robert S. McGarry)
I know delegation is one of the things that has been discussed by some Congressmen. I've talked it over with some and there has been a whole slug of bills introduced. The Corps has not commented on any of the bills to my knowledge. My feeling is that someday there will be some delegation. But at the public meetings that were held nationwide on our regulations, quite a few well-respected people stood up and opposed delegating any authority. So not everybody is in favor of delegation.

(Comment - Dr. Maurice K. Goddard)
I think those are the people that see States where there hasn't been any control in the past.

(Comment - Col. Robert S. McGarry)
They weren't talking about Pennsylvania.

(Comment - Dr. Maurice K. Goddard)
Yes, we've done this since 1913 and then to have a new agency come along and give the same type of permit. If this prevails, certainly I am one who is going to try to influence my general assembly to get us out of the dams and encroachments business and forget about it. But that's counter to what everybody talks about ... giving more responsibility, the States and local governments and everything we tend to do puts us more at the Federal level and less at the local level. We throw away 60 years of good experience. I'm not criticizing you, you're not the judge. I think if they keep 404 to really

navigable waters, Delaware Bay, Ohio River it makes sense, but to put it to Sinnemahoning Creek or Yellow Breeches or Conodoguinet Creek, that's ridiculous.

(Comment - Col. Robert S. McGarry)
Yes sir, by the same token it's pretty galling to me on several projects to see the developer go out and carefully stake out the mean high water line. There was obviously a marsh above his stakes but they filled it. Until July, I had no authority at all.

(Comment - Dr. Maurice K. Goddard)
In that marsh incident, wouldn't that be next to really navigable water?

(Comment - Col. Robert S. McGarry)
Yes sir, but our traditional limit was the mean high water. Now that has been extended to the limit of marsh vegetation which is certainly more reasonable in that area.

(Comment - Mr. Douglas Growitz, USGS)
When you had hearings in Binghamton on Section 404, many farmers spoke in opposition. This disturbed me because I think farmers are generally conservationists and have done a lot to improve the quality of the environment in various ways. So is this going to be a problem? I hate to get all the farmers against the water pollution control efforts.

(Comment - Col. Robert S. McGarry)
Farm communities throughout the country came out very strong against this type of regulation and wanted many more exceptions than are provided. I think I could say the farmers are supported by the Department of Agriculture and many other people. It will be up to Congress to make the decision. They don't want us interferring with their day-to-day practices. For example, a farmer who is a wood harvester. His total forest is under water. Anything he does there he needs a permit and he said, "How can I operate that way?" Get a permit is the answer unless Congress changes our jurisdiction.

(Comment - Mr. C. Peter Carlucci, Jr.)

Colonel, you mentioned that you are instituting a program on the West Branch to regulate the operation of the reservoirs to enhance water quality. Yet, correct me if I'm wrong, I understand that under P.L. 92-500 the Corps will not be allowed to build reservoirs or releases, etc. for the enhancement of water quality.

(Comment - Col. Robert S. McGarry)

Correct, we can't build any more for the purpose of water quality, but there is no regulation restricting our use of existing capacity to improve quality. Of course, the main water quality problem is acid and we can improve it by operating our reservoirs in low flow periods to abate acid.

BASIN STATE REPORT

NEW YORK

by
Paul J. Sausville, Chief
Basin Planning Section, Water Quality Planning Group
New York State Department of Environmental Conservation

New York Program History

I would like to talk today about New York State's programs in water quality planning and water quality management. Let me first address the program history in New York, the program status, P.L. 92-500 and then deal with programs in New York State that begin to address the land use water quality interrelationships that are talked about in P.L. 92-500.

Beginning with the history, New York State doesn't quite go back as far as 1899 but we did begin very early in 1949 when the New York State legislature authorized the classification of all the waterways in New York State. New York State began classifying some 3.5 million acres of lakes in the State and some 70,000 miles of streams and it took approximately 18 years to accomplish this. As you can imagine, it was a very time-consuming effort to address each mile of stream as to its highest and best use and determine whether or not it was a trout stream, fishery, water supply, or bathing area. In 1967 this process was finally completed for every waterway.

The next major act in New York State's history came in 1962 when the State legislature passed Article 12 which among other things, included three aspects of the program that carry into today. Article 12 authorized the discharge permit program in New York State. It authorized the comprehensive sewerage studies program in New York which continues on to this day. In this program, New York systematically carried out a comprehensive sewerage study for every community in New York State with about a $10 million fund over a period of 12 or 13 years. So we have a very good base of planning with regard to our sewerage needs. The third aspect of our New York State 1962 program dealt with operation and maintenance awareness. New York began to train treatment plant operators and began dealing more closely with the inspection of wastewater treatment facilities that were on-line at that point in time.

It wasn't until 1965, however, that New York really came through with financial assistance for localities for operation and maintenance. The voters in New York passed the one billion dollar bond, "Pure Waters Bond Issue." The one billion dollar bond program authorized grant-in-aid for facility construction

and one-third cost-sharing of the operation and maintenance costs of treatment facilities. It also included low interest loans to industries, research programs and the like. These funds were used as match against the Federal Clean Water Restoration Act and were exhausted by 1972. In 1972, the New York voters came through again with the "Environmental Bond Act" which included more than just a water quality approach to environmental management. It included funds for land acquisition, for recreation and for reforestation. The Act addressed the air pollution control effort and provided funds for air pollution control, solid waste and another $650 million for pure waters. In New York State, P.L. 92-500 provides 75% funding on wastewater treatment facilities and New York with these bond monies goes halfway with the localities on the remaining 25%. So that very briefly covers the program.

(Comment - Dr. Maurice K. Goddard)
Do you still give money for operation and maintenance?

(Comment - Mr. Paul Sausville)
Yes.

Status of New York P.L. 92-500

Under the NPDES Permit Program, New York State has bought the "farm"! As Mr. Carlucci pointed out this morning, the Governor signed an agreement with EPA in April and the program became effective October 28th of this fall. There will be a six-month transitional period for New York to take over permit responsibility. New York State now has the program for some 3,600 permits that were issued under the NPDES and SPDES (State permit program). Since enactment of P.L. 92-500, the State has issued 2,400 of these and EPA issued some 1,200, primarily major industrial discharges and principal municipal discharges. So the whole program is now being turned over to the State. There is a six-month transitional period to work out some of the wrinkles on this aspect of the program.

With regard to stream reclassifications, New York has always held that when there was a need for reclassification of the streams, we would do so and there was a process for doing this. With P.L. 92-500 there is a requirement that the classifications and standards be reviewed and updated every three years. New York is in the process of carrying out this requirement and is proceeding on schedule throughout the State. With regard to the Susquehanna - the Upper Susquehanna Basin - hearings were held on the Chemung part of the Upper Susquehanna last October and stream reclassification hearings on the eastern

stem of the Susquehanna are to be held this May 4th.

With regard to point source abatement, needless to say, New York was very anxious to take advantage of the very substantial funds that were available for point source abatement and we moved as rapidly as possible to get projects down to EPA, get them funded and get on line in an endeavor to meet the '77 goal. In the Susquehanna, there are some 87 significant discharges that we identified in the Upper Susquehanna Basin. About 60% of these discharges are considered abated with about 40% unabated. So we're over the hump with regard to controlling point sources.

New York State of course is involved in the 303e planning process and 208 planning. Concerning our 208 type studies in the Upper Susquehanna, we heard about the Binghamton Wastewater Management Study from Colonel McGarry this morning. We have a second study of comparable intensity in Chemung and Steuben Counties. This is being handled by the Southern Tier Central Regional Planning Board. This Board was designated last spring by the Governor to carry out the 208 study with funds of about $800,000. The planning will be completed by November '77 and will include studies of land use water quality interrelationships, water quality modeling of the Chemung River and ground water quality modeling along the Chemung River.

Regarding 303e basin planning, we have completed the basin plan for the eastern branch of the Upper Susquehanna Basin. Some 50 copies of the report were distributed in November and December to agencies that have staff; to agencies that would have technical input to the planning process. We're now revising that report based upon the comments that we received on it. We hope after revisions, to go to the public hearing sometime in April. On the Chemung, we're just beginning the 303e basin planning process. This covers the items that I wanted to deal with on the P.L. 92-500 program.

Land Use-Water Quality Relationships - SEQR Program

I wanted to also go into some of the efforts New York State is taking to come to grips with the land use water quality interrelationships. There are several programs that New York State has been administering right along and several new programs. One new program is the so-called SEQR Program .... State Environmental Quality Review Program, that is modeled somewhat after the environmental impact requirements of the NEPA Law of 1969. This law as you are all well aware, is designed to introduce into the planning and decision-making process, environmental factors and to be sure that these environmental concerns are given appropriate weight commensurate with

the traditional social and economic factors in decision-making. It's not a new program at the State level. In fact, I was surprised to hear there are some 28 other States in the country that have a program similar to New York State's Environmental Quality Review Act. It was passed in the 1975 session of the legislature and New York State has come under some fire on regulations drafted for the program. It's intended to be implemented by any level of government involved in a decision that could affect the environment. This could be local government, county government, or the State.

The environmental review system works like this. If an action is going to have an effect on the environment, there is a requirement that a draft environmental assessment be prepared. This is then circulated to agencies and parties concerned and a public hearing is held if there is sufficient interest in it. The lead agency publishes a notice of determination after all the facts have been reviewed. The process does not permit a veto of any particular project; it is just a mechanism for focusing attention on the environmental concerns. As I mentioned, DEC has come under some fire on it as you might expect. There are certainly good aspects, good qualities to the program, but we have been criticized in three principal areas. First, critics have said that the program will be costly and will add to the cost of the projects. Critics also claim it's going to add to the delay of projects and it's going to distort the approach to decision-making in that it doesn't also include social and economic impacts. So the Department now has gone back to the drawing boards. We had intended to hold public hearings in November. They were cancelled. So we're back on the drawing boards with our regulations. The word is maybe sometime in February they'll go to a public hearing and come out with revised regulations. The program by law is to become effective next June. Exactly how everything is going to work out for the SEQR program in New York State is still somewhat up in the air.

Environmental Management Councils

The next program I wanted to mention is the Environmental Management Councils in New York with which New York is very pleased. This is a program whereby a local body of government can create an environmental board or conservation board, as we call them. They can be county, city or town boards. They have an advisory function, an educational function and a coordinating role in the community. There are some 250 of these that have been formed in New York State: eleven in the Susquehanna. Three of these eleven are county environmental boards.

Soil and Water Conservation Districts

The next program that I want to talk about is the Soil and Water Conservation District's law. In the 1975 session of the legislature, this law was amended requiring that every piece of agricultural land in the State greater than 25 acres was to have a soil and water conservation plan that limits erosion and reduces the amount of pollutants entering the waterways. This is to be accomplished by January 1, 1980. The first requirement is that every landowner apply for planning by January 1, 1978 and that the planning be completed statewide by January 1, 1980, and be reviewed thereafter every five years.

At first blush, this looks like a very ambitious program until you remember that the soil and water conservation districts have been very active for many years ... since back in the early 30's. New York State has about one-third of the area already covered with soil and water conservation plans. Now the law does not have enforcement or implementation teeth. As I see it, it is essentially a call to the agricultural community to follow-up on soil and water conservation programs that they have been implementing for some period of time. Just to give you some idea of the size of this program, I did a "quick and dirty" estimate of the amount of money being placed into soil and water conservation in the Upper Susquehanna Basin portion of New York. I came up with an annual expenditure of $1.2 million a year. This is considerable. It includes services and soil and water conservation measures. So when people start talking about the new programs for controlling nonpoint sources, I think we have to bear in mind that a lot of people have been doing extensive soil and water conservation work for many years. Sounds a little bit like a commercial for the Soil Conservation Service, doesn't it?

Freshwater Wetlands Act

The next program I would like to talk about meshes nicely with Colonel McGarry's discussion this morning and that deals with the New York State's Freshwater Wetlands Act enacted this last spring by New York State's Legislature. The Act has two aspects to it. It requires the State to map all of some 1.4 million acres of wetland areas in New York. The program will be completed in 1977. A second aspect of the program is to regulate activities within the wetland areas; draining, dredging, dumping, construction, etc. I should add that agricultural activities such as grazing, drainage and timber harvesting are exempt in this law.

Wild and Scenic Rivers Program

The last program that I want to talk about in any depth is the Wild and Scenic Rivers Program which again is a program that deals indirectly with water quality management. In 1972, the New York State legislature authorized the Scenic and Wild Rivers Program in New York State. This came about as a result of planning initiated in the Adirondack Park. The program; however, covers all of New York State. Several streams throughout the State were designated in the law as rivers for potential consideration; one of them being the Susquehanna below Cooperstown. There are also several other rivers that are being considered; the Canisteo, the Owego and the Tioughnioga. The program is modeled after the 1968 National Wild and Scenic Rivers Act. None of these rivers, I should emphasize, have been included in the Scenic and Wild Rivers Program at this point in time.

The implementation process for this program goes something like this. First, the river is nominated by an environmental group, by a conservation official or body such as the Susquehanna River Basin Board, perhaps. A study advisory committee is formed; a draft report on the river is prepared; public hearings are held on the nomination; and then the Commissioner of the Department of Environmental Conservation reviews the hearing record and the draft report. The Commissioner either adopts the proposal, modifies it or rejects the report. If the Commissioner adopts the report and believes it's worthwhile to consider the stream in the Wild and Scenic Rivers Program, then he submits the report to the legislature for decision.

If the legislature then designates the river and places it into the program, a land use management program for lands within one-half mile of the river corridor is developed and another process of planning takes place. In this process, DEC and local government jointly work to develop a management plan for the river corridor. A management advisory committee is formed, hearings on the proposed management plans are held and the Commissioner again examines the hearing record and the concept that has been developed for the river corridor.

Mining Regulation Program

The last program on the list is a program for regulating mining activities in the State. It was passed into law, I believe, in 1974. The program hasn't been funded to any great extent, but the Department hopes to promulgate rules and regulations on the mine land reclamation program sometime this spring.

Let me stop now for any questions at this time.

Discussion

(Comment - Mr. Thomas C. H. Webster)

In your 208 planning program, your 303(e) planning program and your other programs affecting the basin, how do you relate them to the Comprehensive Plan that was adopted by the Commission?

(Comment - Mr. Paul Sausville)

Well, as you probably realize, the 303e plan is a compilation of a whole series of plans that have been developed at various units of government, by the Susquehanna River Basin Commission, but even more so, all the little plans that have been put together by the local communities; the communities that are actually dealing with the 201 facility planning. The reclassification program and its hearing process and a whole body of other planning activities support the 303e planning process. The 303(e) plan is essentially a compilation of all plans and a perspective on where New York State stands with its pollution abatement program; a perspective on problems, priorities, significant discharges and corresponding abatement schedules. Some 50 copies are sent out before we even go to public hearing, to let the Commission and other agencies know of the plan. The SRBC has been given a copy of this and as Dr. Goddard and Mr. Bielo pointed out this morning, comments are being supplied to New York State. We haven't received them as yet but I understand they are in the mail.

(Comment - Mr. Jack Carling)

What are the functions of New York's Environmental Management Councils? What do they do?

(Comment - Mr. Paul Sausville)

Well, they do whatever the governing town board asks them to do. Let's take a specific example. Suppose the governing town board decides they want to have an environmental management council. Their first charge is to prepare an open-space index, or an environmental plan. And if they do carry out this first mission, they then may be reconstituted as an environmental board and review projects that come before the town for their environmental impact and for conformance with the town's environmental plan. That's one function that they carry out. You can see with this SEQR process that if local government, town government, gets into environmental impact statements, that they are going to need an arm of local government to implement the process. This is a possible function also for the Environmental Commissions. I was a little skeptical at first as to how they functioned and their usefulness and some-

one talked me into becoming a member of the Environmental Commission. Since that time, I've become very much aware as to how much say they really have in environmental decision-making at the local level. Strictly advisory, but the town board is a very busy group as you can imagine. They have a lot of things that come before them. Whenever there is any environmental flack, they throw it over on the Environmental Commission's desk for their review. You get into all kinds of nitty-gritty things that most of us as State and interstate agencies never come into contact with. Little subdivisions of four or five houses that have a drainage problem and that sort of thing.

(Comment - Dr. Maurice K. Goddard)

Are they funded by local government?

(Comment - Mr. Paul Sausville)

They receive a little bit of money. Such as to print their reports. Strictly voluntary, no salaries involved. Their success depends a lot, of course, on the composition of the board. If you get some really enthusiastic environmental people you can accomplish quite a bit. New York State, of course, has the headwaters area for several major bodies of water in the basin.

(Comment - Mr. C. Peter Carlucci, Jr.)

What steps does your State take in attempting to coordinate with the adjoining States, for example, your 303e planning efforts, talking about one hydrologic unit of water for example, the basin goes up to New York State, the Chemung Basin joins the Tioga River in Pennsylvania? What efforts does the State make and what channels to coordinate their 303e planning as an example with their adjoining States?

(Comment - Mr. Paul Sausville)

Well, as I mentioned, we distribute the basin plan to everyone and we participate of course in the SRBC which provides a very vital function; a very important coordinating role for New York State.

(Comment - Dr. Maurice K. Goddard)

Thank you very much. That was a very good summary. We are going to go from the upper waters down river -- the next is Pennsylvania and Mr. Ted Clista, the Susquehanna River Basin Engineer for our Division of Water Quality in DER who will present Pennsylvania's summary.

BASIN STATE REPORT -

PENNSYLVANIA

by
Theodore P. Clista, Susquehanna River Basin Engineer
Division of Water Quality, Bureau of Water Quality Management
Pennsylvania Department of Environmental Resources

Basic Organization

Here in Pennsylvania, we're commonly known as DER. The Bureau of Water Quality Management has a statewide staff of 240 technical and management personnel engaged in planning, permit processing, monitoring and enforcement activities. In addition to the central office, the Bureau maintains seven regional offices at strategic locations throughout the State to carry out its programs.

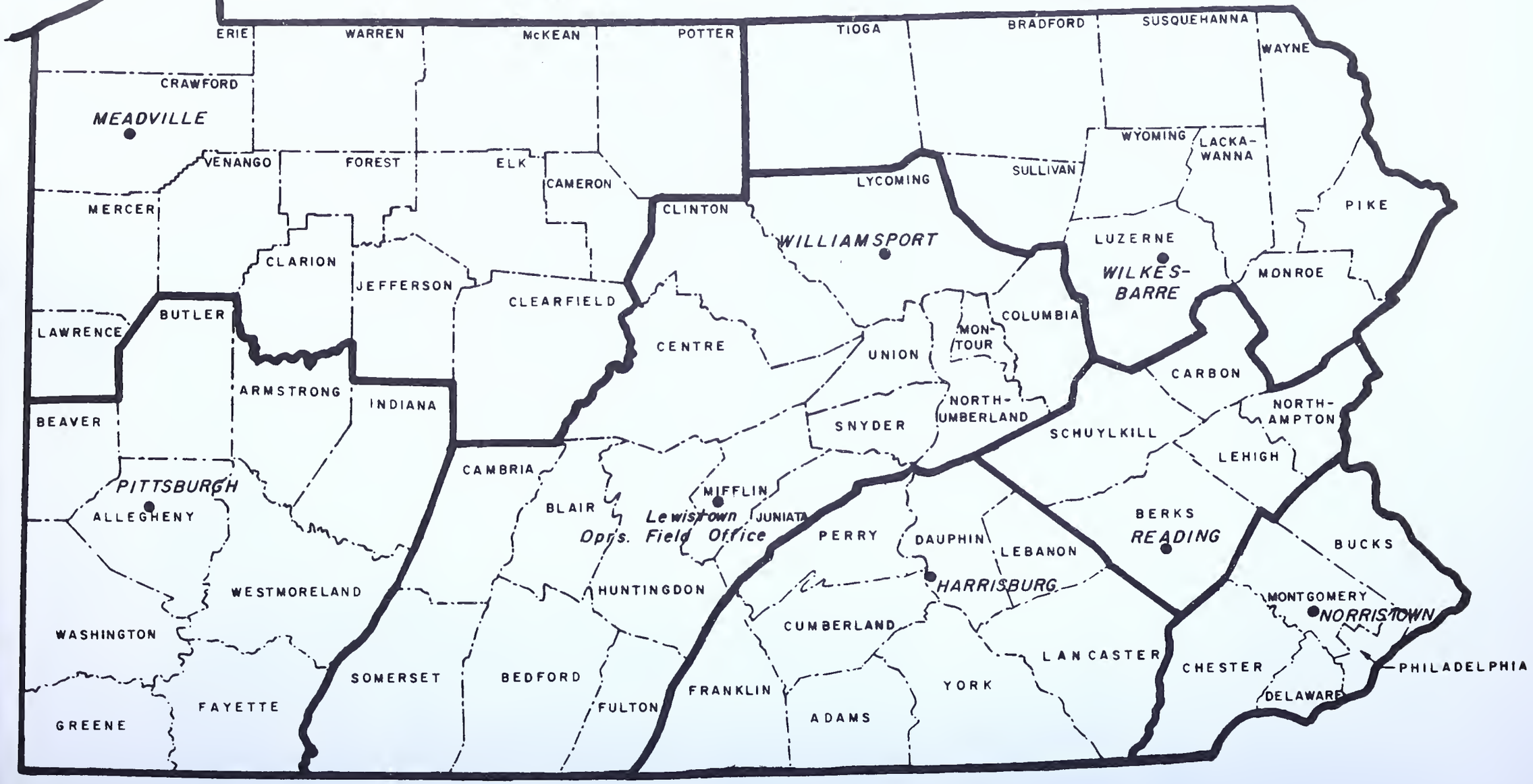
In Figure 1 you see a map of Pennsylvania with DER's regional boundaries. The Susquehanna River Basin is primarily covered by three regional offices shown on the map. The Wilkes-Barre regional office which covers the upper part of the basin. The Williamsport regional office which covers most of the central part of the basin. We also have a Lewistown office operations staff located within this region and the lower part of the Susquehanna is covered by our Harrisburg regional office.

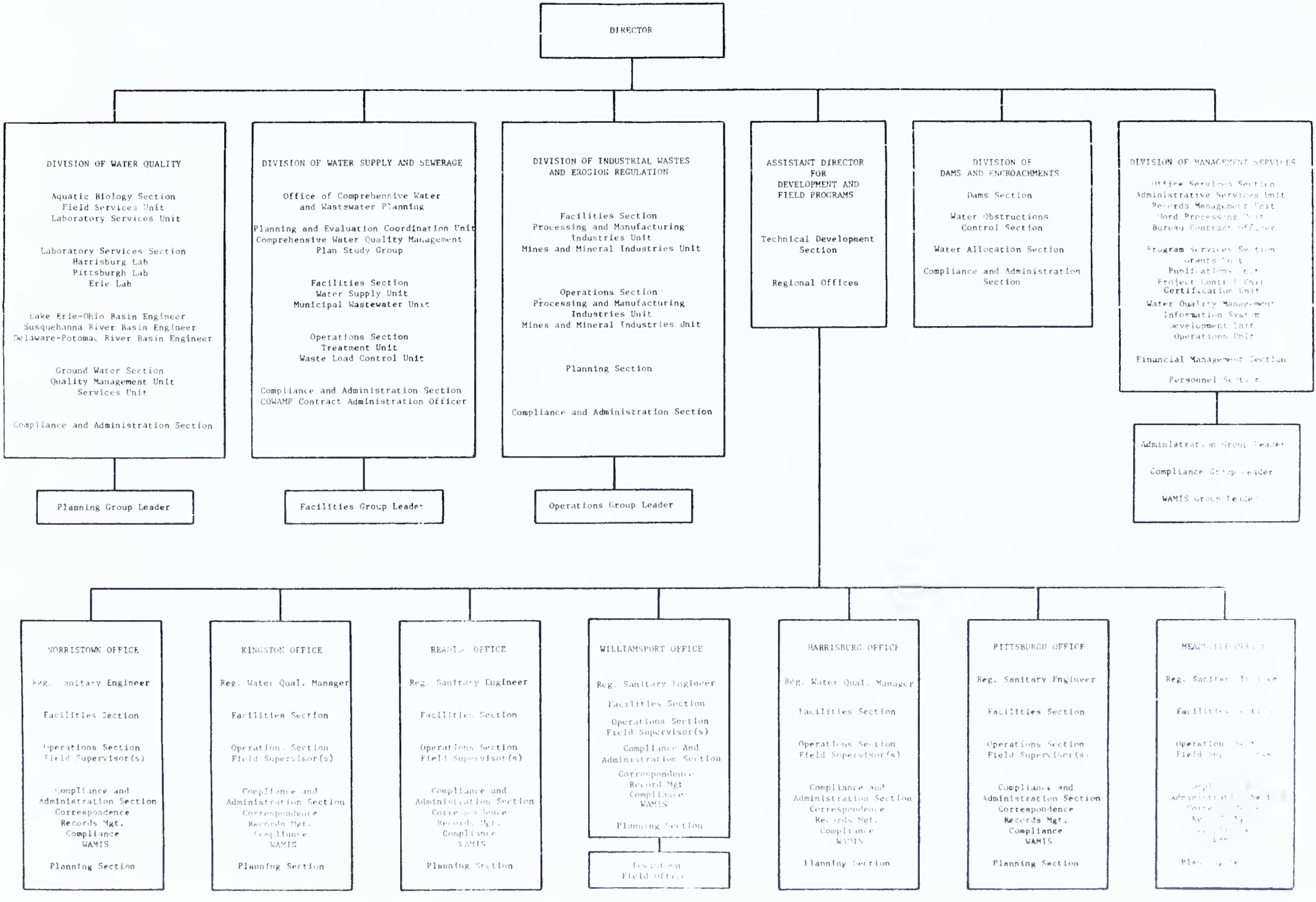
Nearly all the programs are delegated to the regional offices which are organized in various sections, e.g. planning, operations, administration, etc. Figure 2 presents the organization chart of the Bureau. The top blocks represent the various technical divisions of the Bureau, at the bottom is the organizational staff of the various regional offices. We have a regional sanitary engineer; a water quality manager responsible for the overall programs within that region; a facility section which is responsible for processing permits; an operations sections which is responsible for monitoring compliance; an administration section which deals with the enforcement problems; and lastly, a planning section.

On an annual basis, approximately 2,500 permit applications are processed; 20,000 field contacts are made; and 30,000 chemical and 35,000 bacteriological samples are analyzed. In June, 1975 DER and the Commission executed an agreement of understanding for joint review of projects. The Bureau uses appropriate guidelines and criteria in the Commission's Comprehensive Plan and thus, saves a possible duplication by the Commission in this effort.

FIGURE 1

REGIONAL WORK AREAS
DEPARTMENT OF ENVIRONMENTAL RESOURCES
COMMONWEALTH OF PENNSYLVANIA




DIRECTOR
DIVISION OF WATER QUALITY
Aquatic Biology Section
Field Services Unit
Laboratory Services Unit
Laboratory Services Section
Harrisburg Lab
Pittsburgh Lab
Erie Lab
Lake Erie-Ohio Basin Engineer
Susquehanna River Basin Engineer
Delaware-Potomac River Basin Engineer
Ground Water Section
Quality Management Unit
Services Unit
Compliance and Administration Section
Planning Group Leader
DIVISION OF WATER SUPPLY AND SEWERAGE
Office of Comprehensive Water and Wastewater Planning
Planning and Evaluation Coordination Unit
Comprehensive Water Quality Management Plan Study Group
Facilities Section
Water Supply Unit
Municipal Wastewater Unit
Operations Section
Treatment Unit
Waste Load Control Unit
Compliance and Administration Section
COWAMP Contract Administration Officer
Facilities Group Leader
DIVISION OF INDUSTRIAL WASTES AND EROSION REGULATION
Facilities Section
Processing and Manufacturing Industries Unit
Mines and Mineral Industries Unit
Operations Section
Processing and Manufacturing Industries Unit
Mines and Mineral Industries Unit
Planning Section
Compliance and Administration Section
Operations Group Leader
ASSISTANT DIRECTOR FOR DEVELOPMENT AND FIELD PROGRAMS
Technical Development Section
Regional Offices
DIVISION OF DAMS AND ENCROACHMENTS
Dams Section
Water Obstructions Control Section
Water Allocation Section
Compliance and Administration Section
DIVISION OF MANAGEMENT SERVICES
Office Services Section
Administrative Services Unit
Records Management Unit
Word Processing Unit
Bureau Contract Officer
Program Services Section
Grants Unit
Publications Unit
Project Control Unit
Certification Unit
Water Quality Management Information System Development Unit
Operations Unit
Financial Management Section
Personnel Section
Administration Group Leader
Compliance Group Leader
WAMIS Group Leader
NORRISTOWN OFFICE
Reg. Sanitary Engineer
Facilities Section
Operations Section
Field Supervisor(s)
Compliance and Administration Section
Correspondence
Records Mgt.
Compliance
WAMIS
Planning Section
KINGSTON OFFICE
Reg. Water Qual. Manager
Facilities Section
Operations Section
Field Supervisor(s)
Compliance and Administration Section
Correspondence
Records Mgt.
Compliance
WAMIS
Planning Section
READING OFFICE
Reg. Sanitary Engineer
Facilities Section
Operations Section
Field Supervisor(s)
Compliance and Administration Section
Correspondence
Records Mgt.
Compliance
WAMIS
Planning Section
WILLIAMSPORT OFFICE
Reg. Sanitary Engineer
Facilities Section
Operations Section
Field Supervisor(s)
Compliance And Administration Section
Correspondence
Record Mgt
Compliance
WAMIS
Planning Section
Lock Haven Field Office
HARRISBURG OFFICE
Reg. Water Qual. Manager
Facilities Section
Operations Section
Field Supervisor(s)
Compliance and Administration Section
Correspondence
Records Mgt.
Compliance
WAMIS
Planning Section
PITTSBURGH OFFICE
Reg. Sanitary Engineer
Facilities Section
Operations Section
Field Supervisor(s)
Compliance and Administration Section
Correspondence
Records Mgt.
Compliance
WAMIS
Planning Section
MEADVILLE OFFICE
Reg. Sanitary Engineer
Facilities Section
Operations Section
Field Supervisor(s)
Compliance and Administration Section
Correspondence
Records Mgt.
Compliance
WAMIS
Planning Section

Ambient monitoring of chemical and biological quality of surface waters is carried out at more than 300 locations throughout the State on a regular basis and at thousands of groundwater locations on a more sporadic basis. Several hundred special biological investigations are conducted yearly to evaluate the effects of waste discharges and to determine overall quality of streams.

Enforcement activities commonly include criminal or equity actions, and negotiated settlements in order to achieve compliance and to improve water quality. A staff of more than 30 attorneys are involved in legal activities in the Department, and about 25 percent of their time is devoted to the water quality program.

Clean Streams Law

The basis for Pennsylvania's water pollution enforcement program is the Clean Streams Law. This law prohibits the discharge of polluting materials into the waters of the State. Violations of the law are subject to criminal and civil penalties, as well as equity suits. The criminal penalties involve a summary offense for the first violation and a misdemeanor for the second violation. A maximum criminal penalty of $5,000 or one year in jail may be imposed for each separate day of violation. Civil penalties are assessed after a hearing before an Environmental Hearing Board. A maximum $10,000 civil penalty may be imposed plus $500 for each day of continued violation. The maximum civil penalty may be subjected to multiple penalties which total more than $10,000. Amendments to Pennsylvania's Clean Streams Law have been introduced in the State legislature and, if enacted, would revise civil and criminal penalties to correspond to Federal law.

We have also had an amendment to Pennsylvania's constitution on the environment which grants the people a right to clean air, pure water and to the esthetic values of the environment which gives us further direction in our programs.

Departmental Regulations

Regulations of the Department require a minimum of secondary treatment of domestic waste or its equivalent for industrial waste prior to discharge. The Department has not received EPA delegation of the NPDES program until fines provided in the Pennsylvania Clean Streams Law are changed to be at least as great as the Federal Act and an administrative agreement is consummated between DER and EPA. In the interim, State permit requirements are imposed to be no less stringent than

EPA requirements.

Special DER water pollution control regulations adopted in 1970 require 80 percent removal of phosphorus in the Lower Susquehanna Basin extending from the Juniata River to the Pennsylvania-Maryland State line. Implementation plans developed as part of water quality standards require more than secondary treatment in many cases in order to protect water quality. Federally approved water quality standards have been established for all surface waters in the basin. We will review the standards periodically and make refinements as new scientific planning, or water use information becomes available. Water quality criteria are published as Chapter 93 of DER's rules and regulations.

Present Water Quality Situation in Pennsylvania

Approximately 75 percent of the 6,000 miles of major streams in the Pennsylvania portion of the Susquehanna River Basin meet or exceed water quality criteria not considering bacteriological evaluation. Major streams are those on which there are at least one of the established 119 basin water quality monitoring stations or are those streams that are named in the State publication entitled "Pennsylvania Gazetteer of Streams". Bacteria consideration is not included in this evaluation due to a lack of confidence in much of the data that is available and the variety of sources of bacterial contamination. At the stations we do, however, monitor for chemical, bacteriological and biological information.

The true measure of the effectiveness of a water pollution control program is the length of streams improved. Over the last four years, 225 miles of streams in the basin have improved while 46 miles were degraded, or a net gain of 179 miles of streams. Many of these are temporary degradations wherein a spill has occurred or an operational problem has occurred at a wastewater treatment facility, and generally they are of short duration and are corrected.

One of the major water quality problems in the Pennsylvania portion of the basin continues to be drainage from abandoned mines which pollute more than 1,000 miles of streams. Some of the polluted streams include all or portions of the Tioga River, West Branch Susquehanna, North Branch Susquehanna, Lackawanna River, Clearfield, Moshannon, Sinnemahoning, Shamokin, Mahanoy and Swatara Creeks. Pennsylvania has an active abatement program, but available funds are far short of over $400 million estimated to be necessary to clean up the pollution. Financial assistance will be necessary if this problem is to be resolved.

Over the years, Pennsylvania has insisted that a substantial part of the problem resulted from the mining of coal to support the war efforts and to sustain the national economy. In this light, Federal financial assistance would seem to be warranted. We recommend that abandoned mine drainage abatement be given one of the highest water quality priorities in the basin.

Other water quality problems are more localized in nature where waste discharges are large in comparison to the receiving streams. Portions of the Little Juniata River, Frankstown Branch, Spring, Codorus and Quittapahilla Creeks are some of the more polluted streams due to sewage and industrial wastes. There are 75 sewage and 42 industrial significant waste discharges in the Pennsylvania portion of the basin. These are primarily the big pollution problem cases which we reported to EPA as part of our FY-1976 strategy. Enforcement orders have been issued to have actions taken to eliminate these problems. The abatement of municipal sewage will require a substantial commitment of Federal and State grant monies. Currently statewide, of 570 projects pending, only 211 appear to be fundable.

Table 1 shows you the type of financial resources that are necessary to clean up the problems within Pennsylvania as a whole to meet the objectives of the Federal Act. This amounts to something like $9.3 billion. Secondary treatment alone will require something on the order of over $1 billion.

With the implementation of such clean up efforts, the major pollution problems expected to remain will be pollution from abandoned coal mines, general nonpoint source problems, spills, pipeline breaks and other acute pollution discharges. One of the more difficult tasks in the basin will be the conservation of existing high quality water where development pressures are great.

Nonpoint Source Pollution

Pennsylvania initiated one portion of its nonpoint source program in 1972 with the adoption of regulations that require every earthmoving activity to be conducted in such a way as to prevent accelerated erosion and sedimentation. The Pennsylvania program requires that a plan for erosion and sedimentation controls must be developed and, in larger operations, a Departmental permit must be secured. Implementation of the erosion and sedimentation control program is a cooperative effort between our staff in the water pollution control program, the legal staff, and the soil and water conservation program.

Sediment pollution control is achieved through the use of

TABLE 1

PRELIMINARY PENNSYLVANIA ESTIMATE
1974 COSTS REPORTED FOR CONSTRUCTION OF PUBLICLY-OWNED WASTEWATER TREATMENT FACILITIES

Construction Requirements	Costs - Millions of 1973 Dollars
Secondary Treatment	1,028
More Stringent Treatment Required by Water Quality	201
Correction of Sewer Infiltration/Inflow	89
Major Sewer Rehabilitation	57
Collection Sewers	1,185
Interceptor Sewers	625
Correction of Combined Sewer Overflows	2,394
Treatment and/or Control of Stormwaters	3,473
TOTAL	9,322

soil erosion controls rather than stream monitoring practices utilized in the industrial waste and sewage point source programs. The practices being used in the land protection program have been developed from over forty years of soil and water conservation district activities. The sediment pollution and siltation problems from urban and industrial activities and agriculture are being investigated.

Other Water Quality Management Programs and Problems

The major water quality problems of groundwaters come from failure of on-lot sewage systems, the mining of coal, leaching from improperly constructed or operated solid waste land disposal sites, pollution from spills or careless or improper transport of materials and the intentional illegal disposal of wastes. The Department has an active program for preventing and abating groundwater pollution. Priority has been given to problems caused by earthen impoundments of toxic and hazardous material, solid waste disposal sites, coal mine refuse disposal and problems relating to groundwaters now being used by the public.

Because of increasing national concern of the presence of polychlorinated biphenyls (PCB's) in the environment, DER is now designing a statewide fish collection survey. This will include approximately 25 sampling locations in the Susquehanna River Basin. The program will be underway in the near future so that the work can be completed by mid-1976.

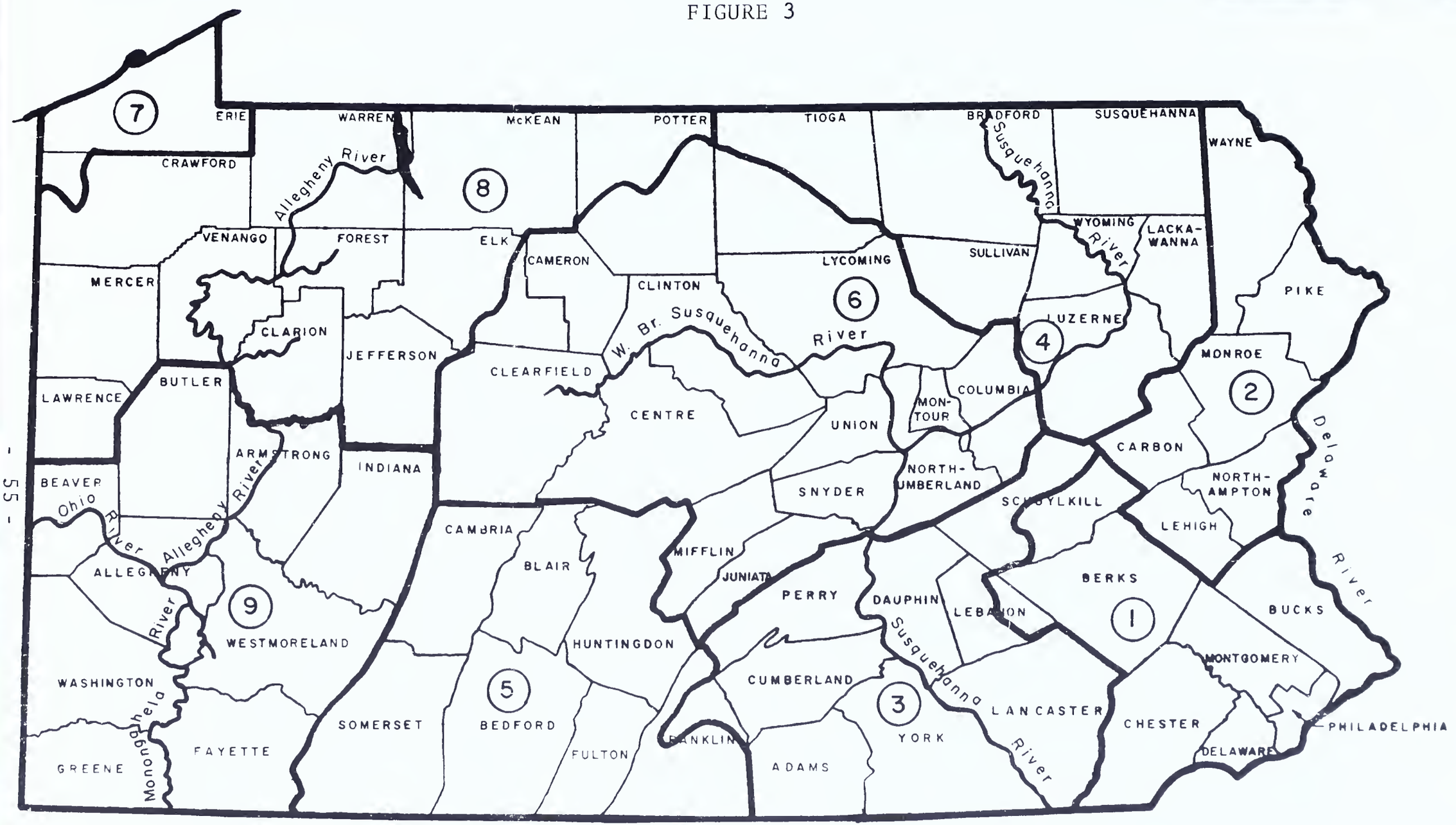
In a continuing effort to evaluate water quality, biological surveys of the main stem Susquehanna are also being scheduled over the next three years. These surveys will provide valuable additional information on the quality of the stream.

COWAMP

Pennsylvania is placing major emphasis on water quality management planning -- COWAMP is an acronym for DER's water quality planning program. The planning effort is designed to fulfill the requirements of our Clean Streams Law as well as Federal laws and regulations related to water pollution control. A large part of this effort involves carrying out studies in nine geographical areas which will determine methods to be implemented for the enhancement and protection of surface and groundwater quality throughout the State.

Figure 3 illustrates the nine geographical areas within Pennsylvania. COWAMP study area #4 primarily involves the upper

FIGURE 3



COMMONWEALTH OF PENNSYLVANIA

WATER QUALITY MANAGEMENT PLANNING STUDY AREAS

part of the basin. COWAMP study area #6 covers the central part, primarily the West Branch Susquehanna. COWAMP area #3 covers the lower Susquehanna. The studies will develop comprehensive water quality management plans (COWAMP) to meet both short-term needs and projected growth requirements. They will encompass municipal and industrial wastewater collection, conveyance, treatment and disposal; and mine drainage, combined sewer and agricultural pollution abatement; maintenance of groundwater quality; and the disposal of sludges and other process by-products. The studies will include consideration of environmental values - both in terms of constraints on growth and in evaluating alternative plans. The studies will inventory and define the pollution problems posed by each activity; identify the engineering, financial and institutional alternatives and recommend plans, regulatory policies and actions required to achieve water quality objectives in the study areas.

One of the unique features of this program is the alternative environmental futures, which allow the development of choices through a public participation program as to what the environment should look like in the future. Groundwater investigation will be included as groundwater quality determines to a large extent what the quality of surface waters will be. Institutional financial design is also a unique feature in this study because we feel these systems need to be developed in order to implement the plan.

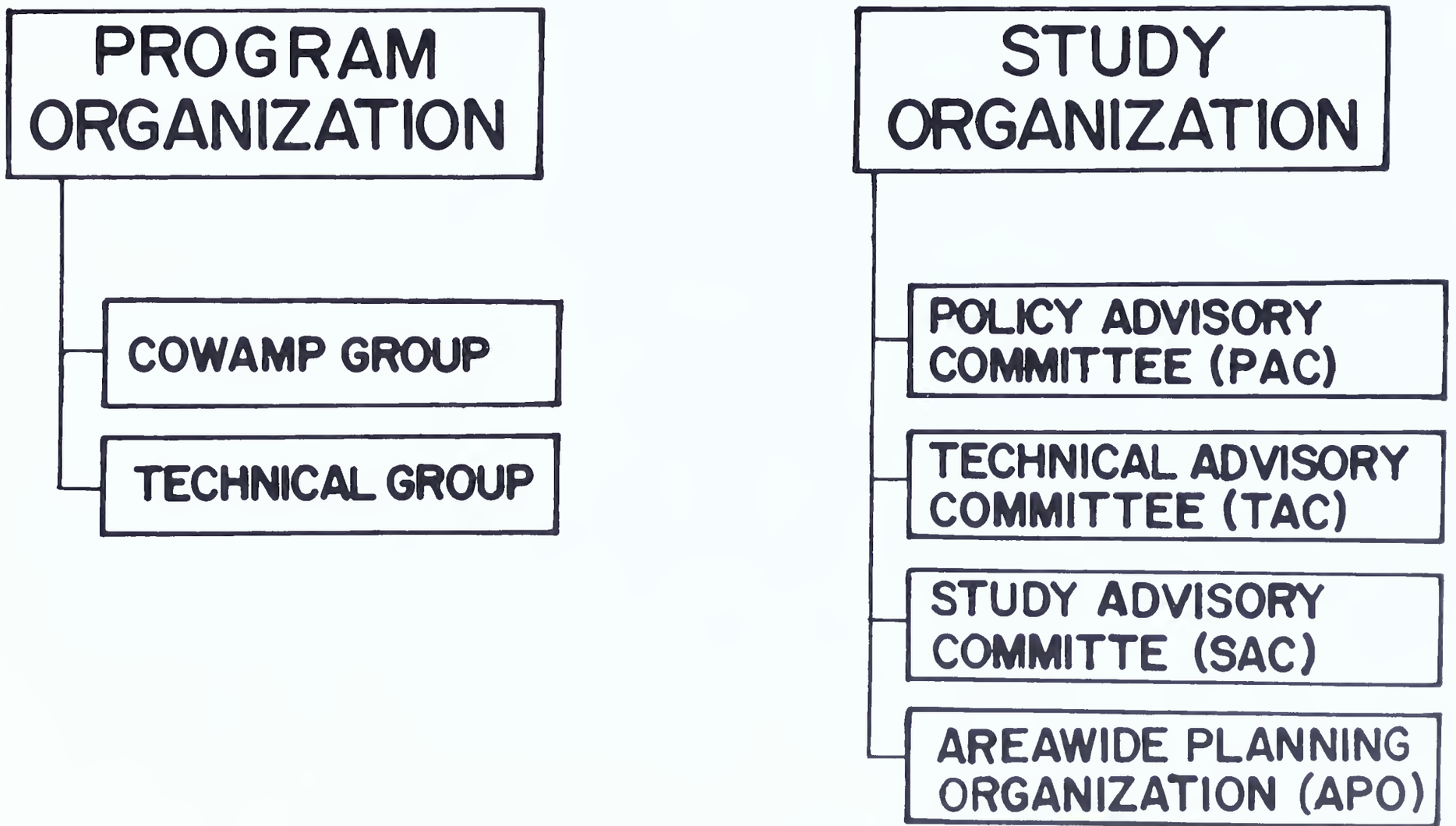
We also have several computer programs which have been developed for use in the studies to provide economic and financial analysis of system and facility components required for comparison of alternatives (ECOFIN) and to evaluate the water quality impact of alternatives (UDOM). The programs will also be used for ongoing planning following completion of the studies.

Specific provisions for a high level of public participation is included in the COWAMP studies. Advisory committees to DER have been created and meet regularly to review study materials while still in draft form.

Figure 4 shows that on a State level we have a program organization which includes a policy group now known as a COWAMP group and the name was changed to be more consistent with the type of activities that this group looked at. This provides an evaluation on a statewide level as to the direction the program has taken and includes not only members of DER but other State agencies. The technical group looks at the technical aspects of the studies and determines whether these might require further study or policy direction on a statewide level. The study organization includes a policy advisory committee,

FIGURE 4

COWAMP COMMITTEE ORGANIZATION



which we commonly call PAC, and each study area is made up of local government officials and various interstate agencies. The SRBC is included on this and as is the Interstate Commission on the Potomac River.

The technical advisory committee includes representation from various areas of technical expertise which help to resolve technical problems which arise during the study. The study advisory committee (SAC) is the citizens group which lends local direction to the various elements which should be included in the study and evaluation of those elements. The areawide planning organizations throughout the State are also involved in this COWAMP organization by lending administrative support in conducting the committee meetings and other aspects of the public participation program.

About 40 committee meetings have already been held in the Susquehanna Basin study areas. More than 1,000 individuals are on the COWAMP mailing lists in these areas. In addition, general news releases are issued periodically to keep the public advised of study progress and important issues. The program is designed to provide the opportunity for public participation from both outside the more formal committee structure as well as within it.

One of the mechanisms we've devised as part of the study is a handbook for citizens called "A Key to COWAMP" which comes in 15 units and is related to study material which is under review at any particular time. This information is mailed to committee members prior to receiving the information developed as part of the studies. They can anticipate what will be coming and to generate questions in their own minds to provide adequate participation. We've also established a simple mailing address for anybody who is interested in any of the information that is being developed as part of this program and by simply addressing an inquiry to this address, anybody can get any information which they desire to have related to the study.

The studies in the Susquehanna River Basin portion of the State began in April, 1974 and will continue for three to four years. The inventory information is now nearing completion and work on projections just getting underway. An interim report with information including development of water quality management alternatives for environmental futures selected through the public participation process should be completed for each of the studies before the end of 1976. When the COWAMP program is completed it will represent the water quality management element of the State Water Plan, which is the total Water Resources Plan for the State.

The Commission is an active participant in the COWAMP

studies. The Commission staff is represented on both Policy and Technical Advisory Committees. We believe that the plans which are developed as a result of these studies will provide direction for orderly and efficient planning in the Susquehanna River Basin and a more meaningful program of implementation. We look forward to a continuing cooperative effort in managing Susquehanna River Basin waters.

Discussion

(Comment - Dr. Maurice K. Goddard)

I would like to make one additional comment. The Department is spending more than $12 million on the COWAMP studies (and some people think that is an awful lot of money), but when you look at that other figure, it looks like we're maybe going to spend $9 billion -- it's pretty small potatoes -- to be sure that we are spending it wisely. In terms of what you're going to spend maybe is a very small investment in the planning process which I think is certainly well justified.

(Comment - Unidentified Person)

Mr. Clista, you didn't mention anything about 208 planning. How do you expect that it will take place within the Susquehanna River Basin?

(Comment - Mr. Theodore Clista)

The COWAMP studies will be a major part of the requirements of the 208 studies. There probably will be some additional requirements. We're studying the 208 regulations which just came out in November of '75 to see what impact that's going to have on the program. Prior to that time, we've had the proposed regulations. We made an evaluation of those (the proposed regulations) and it appears that additional emphasis, particularly on nonpoint sources, would be required. However, we haven't completed our evaluation on the regulations that have just come out to determine exactly what impact that is going to have on the program. But we felt all along that the COWAMP studies will be more of an integration of basin planning and areawide planning and it appears that's the direction the regulations have now taken.

(Comment - Dr. Maurice K. Goddard)

Are you aware of the fact that the State has designated two areas under 208; the DRBC and Southwest Regional Planning Commission? But as Mr. Clista points out, we are evaluating more areas. We hope by April we can meet their requirements.

BASIN STATE REPORT -

MARYLAND

by
Mr. Henry Silbermann, Deputy Director
Water Resources Administration
Maryland Department of Natural Resources

Legislative History

Regarding the State of Maryland's legislative history, water pollution control, particularly laws and regulations, a separate program was established in 1947 when the Water Pollution Control Law was enacted by the Maryland State legislature. (As an aside, Mr. McKee served as Secretary to the Committee that established this first law for the State of Maryland devoted exclusively to water pollution control.) During the decades following, the intensity and scope of water pollution control increased as exemplified by more comprehensive and restrictive legislation, regulations, integrating water pollution control with surface and groundwater appropriations, and planning for water supply and sewer services, scenic rivers, reservoirs and dams, flood control, shore erosion control, sediment control, coastal zone management, and related water resources matters. At present, and in fact over the past 30 years, water pollution control in Maryland is shared by the Water Resources Administration of the Department of Natural Resources and the Environmental Health Administration of the Maryland Department of Health and Mental Hygiene. While this dichotomy in water quality management in Maryland makes the task more difficult, in general, staff of both agencies work well together to achieve the required water quality protection. For those who would like to follow the specific laws and read them in detail, water resources management legislation is codified in Section 8 of the National Resources Article of the Maryland Code. Comparable legislation for public health protection relating to water pollution control is codified in Article 43 (Health) of the Maryland Code. In addition, water pollution control regulations have been promulgated by the Secretary of Natural Resources. These were last revised on September 1, 1974. For any of you that would like copies of some of these documents, except for the law which must be obtained from the publisher, the Michie Company of Charlottesville, Virginia, please let me know.

State Regulation of Water Pollution Control Programs

The regulations on water pollution control include among

other requirements, discharge permit provisions, classifications of waters, classification and certification of wastewater works superintendents, a policy on antidegradation, and similar matters which are common to these types of regulations.

Water quality management within the Water Resources Administration is conducted by three agency divisions: permits, enforcement and technical services. The Permits Division has the responsibility for the issuance or denial of discharge permits, permits for waterway construction, surface and groundwater appropriations, oil operations, and requisite water quality certifications, and licenses for permits for wetlands. On September 5, 1974, the State of Maryland received delegation from EPA to conduct the NPDES Program, and since that time has been issuing joint State and NPDES permits. A memorandum of understanding was agreed to between the Administrator of EPA, Russell Train, and State of Maryland officials, that the Federal National Pollutant Discharge Elimination System permits would be issued as joint documents with the State discharge permits. The request for this delegation was filed with EPA by Governor Mandel in September, 1973. The EPA delegated its NPDES responsibility on September 5, 1974, with the caution that the permit system must be conducted in accordance with the provisions and specifications of the Federal Act (P.L. 92-500). It was accepted by the Governor of Maryland on the basis that it would satisfy four principles. These are the principles that the State established for acceptance of the NPDES program. One, that it would provide one-stop service for all applicants for State and NPDES permits. Two, that Maryland would handle all classes of discharge permits, not only those which are small, inconsequential, or perhaps environmentally not as significant. Three, that Maryland would obviously need to be kept fully informed of Federal laws, rules and regulations, and that it would also keep informed of guidelines so that the full requirements of Federal statutes would be met by the permits as issued. And finally, that nothing in the delegation to the State of Maryland to implement the Federal program, then or at any time, would in any way counteract the effectiveness of the State's water pollution control program mandated by State law.

It is now approximately 16 months since the State assumed the responsibility for the conduct of the NPDES program. Has it been successful? We've issued a great many permits and we're now working well with the Regional Office of EPA. We would judge, perhaps cautiously, that the program is working well; we look forward with a great deal of hope and promise to an even better joint relationship on this matter in the future.

In addition to 411 State and NPDES discharge permits issued by the Water Resources Administration during fiscal year

1975 (this included all the major dischargers in the State of Maryland, and some of the so-called minor dischargers, also) the Permits Division of the Water Resources Administration issued 66 groundwater discharge permits, 15 surface water appropriation permits, 394 groundwater appropriation permits and 9,523 well construction permits. This is only a partial listing of the total activity. Additional information is available in some of the publications which have been provided separately to the Susquehanna River Basin Commission.

The Enforcement Division of the Water Resources Administration conducts inspections of facilities which discharge or may discharge into State waters. It conducts investigations of pollution incidents and compliance monitoring. During fiscal year 1975, the Division received 891 complaints from citizens and other agencies or persons, conducted 17,791 separate inspections, took 707 enforcement actions, of which six were civil penalties which can be assessed under Maryland law by the Secretary of Natural Resources. Also included in this list are 15 decisions by courts.

The Technical Services Division of the Water Resources Administration conducts water quality monitoring and performs hydrologic and other technical and laboratory services. The water quality monitoring program is responsible for assessing water quality in 19 subbasins which comprise the waters of the State of Maryland. In addition, this program conducts primary network monitoring. Modern laboratory facilities for the testing of water quality parameters (including PCB's, other chlorinated hydrocarbons, trace metals and other trace residues) are established in the Natural Resources Complex, which is the State office building in Annapolis, and the Water Resources Administration's regional office in Cumberland, Maryland.

Compliance with various and complex provisions of the Federal Water Pollution Control Act. Amendments of 1972 require, as you all know and heard during this session today, a great many program delineations, reports and administrative actions. The State of Maryland, let me say very simply, has complied with all of those requirements and has filed the necessary reports, such as those required annually pursuant to Section 106 of the Federal Act. The State is developing the basin plans under Section 303(e), and has filed the required 305(b) report. This is the first copy of the Maryland Water Quality Inventory, 305(b), report, as it came off the press yesterday.

Copies of the complete 305(b) document entitled, "Maryland Water Quality 75", are available at the cost of $15 which includes the cost of reproduction, mailing and handling. However, individual chapters may be obtained free of charge. Those

chapters include:

Chapter 1 -- Introduction and Summary
Chapter 2 -- Chesapeake Bay Area
Chapter 3 -- Lower Susquehanna River Area
Chapter 4 -- Coastal Area
Chapter 5 -- Pocomoke River Area
Chapter 6 -- Nanticoke (Wicomico River) Area
Chapter 7 -- Choptank River Area
Chapter 8 -- Chester River Area
Chapter 9 -- Elk River Area
Chapter 10 -- Bush River Area
Chapter 11 -- Gunpowder River Area
Chapter 12 -- Patapsco (Back River) Area
Chapter 13 -- West Chesapeake Bay Area
Chapter 14 -- Patuxent River Area
Chapter 15 -- Overview of the Potomac River Drainage Area
Chapter 16 -- Lower Potomac River Area
Chapter 17 -- Washington Metropolitan Area
Chapter 18 -- Middle Potomac River Area
Chapter 19 -- Upper Potomac River Area
Chapter 20 -- North Branch Potomac River Area
Chapter 21 -- Youghiogheny River Area

This is an example what State governments, under the Federal Act, are now required to do, and keep in mind that the tables, the figures and the narrative in this document are essentially distillations of a great deal of work that has been done in water quality management in Maryland.

Section 208 - Areawide Waste Treatment Management

Regarding Section 208 of the Federal Act, the Governor of Maryland designated the Regional Planning Council as the 208 planning agency for Baltimore City and its five surrounding counties. EPA designated the Metropolitan Council of Governments as the 208 planning agency for the Washington metropolitan area which includes the Maryland counties of Prince Georges and Montgomery. The remaining counties of the State have been nondesignated by the Governor of Maryland indicating that a State agency, in this instance, the Water Resources Administration of the Department of Natural Resources, will do the necessary 208 planning.

Maryland commented extensively on the proposed provisions of Section 208 regulations when they were published in the Federal Register on September 8, 1975. The final regulations were published recently. We believe that the revisions made in the regulations indicate the comments made by the State of Maryland and by other States were considered, and that the

draft regulations changed significantly as a result of such comments.

Section 303 - Water Quality Management Plans

Briefly, permit me to give you some comment, and it has to be rather brief, on our 303(e) plans, or what we call water quality management plans. As I indicated, the State has 19 subbasins, one of which is called the Chesapeake Bay. We have indicated to the Regional Office of EPA that we will complete the draft of these river basin plans, that is, the 303(e) plans, by June 1976. Three plans already have been completed, and some are being revised now. The first completed was the Potomac Metro area. It was completed and submitted in June of 1974 and then to EPA's regional office. It is now back in our hands for certain revisions that the Environmental Protection Agency has requested be made. A report on the Patuxent River Basin, which is the only river basin which is totally intra-state waters, totally within the State of Maryland, was completed late in 1974. That plan is also being revised to reflect current thinking and concerns of the State of Maryland and of EPA. The report on the Patapsco River Basin, actually called the Patapsco/Back River Basin, (which includes the area of Baltimore Harbor, and Back River which receives discharges from the largest treatment plant within the State of Maryland, the Back River Wastewater Treatment Plant), was completed in late 1974 and is also now being revised. The remainder of the basin plans will be completed early in 1976 or by June of 1976. I was told just the other day by our planning group that our effort in this regard is on schedule. As you know, the development of these plans is an effort that involves not just a staff work, but extensive participation by the public, what we have identified as "public advisory councils" and "government policy groups" who review the process of planning at every step and have a major input into the type of services to be anticipated and provided under this planning effort.

Section 404 - State Perspective

Officials of the State of Maryland have been directly involved in the Corps of Engineers regulations and EPA guidelines on Section 404 of the Federal Act. The comment made earlier by Colonel McGarry referred, of course, to those provisions and to a very close relationship on dredge and fill activities between the Baltimore District of the Army Corps of Engineers and the Department of Natural Resources of the State of Maryland. We have common goals, although we may have some differences on how we should work to achieve those goals. Maryland's concerns are very similar to those expressed by Dr.

Goddard before: where a State like Maryland or Pennsylvania has a very active program in water resources management, and this is duplicated - even in part only - by a Federal effort, is it really in the interest of the citizens to continue a duplicative and redundant effort? Questions like this are particularly valid today.

I have been directly involved with some of the efforts being made by organizations like the National Governors' Conference and the Interstate Conference on Water Problems, in trying to work out an effective mechanism for joint effort by the States and by the Corps of Engineers and EPA, in this very important area of controlling the disposal of dredged or fill material.

State Problems and Programs

I would like now to briefly review some of the water quality problems, and some pertinent studies which have been made in the Chesapeake Bay, that may be of interest to you. I provided several excerpts from the 305(b) report* I referred to earlier to the members of the Commission. If someone else has a particular interest in any of these, again I say, let me know and I'll be glad to provide the information to you. These excerpts are summary statements. First, there is a table* for each one of the 19 basins, which describes water quality goals satisfying Section 305b(1) b) for 1974 and 1983. The table includes a subbasin designation, the number of segments in the subbasin, whether or not it meets water quality standards as measured by Maryland standards for dissolved oxygen, temperature, pH and bacteria, and whether or not it will meet the fishable and swimmable water requirement of the Act by 1983.

Chapter Two of the thick document I showed you earlier is called "Chesapeake Bay Subbasin." In Chapter Two,* the Chesapeake Bay subbasin is described as follows: in 1974 the water quality was generally good; some of the segments in the subbasin have degraded water quality, but as a whole, the basin has good water quality. The dissolved oxygen values of surface waters in this subbasin met the standard for all stations, that is, not less than 5.0 parts per million D.O. Temperature standards were not contravened since there are no thermal discharges directly to the Bay at present except for the Calvert Cliffs Nuclear Power Plant which at the time this report was first prepared, was just starting out. As of this time, we have not seen any significant environmental degradation caused by discharges from the Calvert Cliffs power generating plant. Because of the way the Calvert Cliffs discharge permit is written, environmental studies will continue for several years. If there should be any long-term effect not now perceptible,

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* (Ed. Note: See Appendix B.)

these studies should reveal them. So, we are not stopping to look at the environmental consequences of discharges from the Calvert Cliffs Nuclear Power Plant.

A number of areas in the Chesapeake Bay are considered not acceptable for shellfish harvesting due to local violations of the bacteria standard. The majority of these are buffer zones around sewage treatment plant outfalls which discharge directly to the Bay. Otherwise, the bacteria standard for water contact recreation was met throughout the Chesapeake Bay subbasin. Studies by the Environmental Protection Agency have disclosed rapidly increasing eutrophication in the upper Chesapeake Bay during the 1969-1971 period, with nutrient and chlorophyll a levels reaching higher values toward the end of this period.

As a result of the EPA studies and modelling studies contracted for by the Water Resources Administration, Maryland has established a policy of nutrient removal for point sources discharging directly to the Bay. This places limitations on phosphorus concentrations in discharges to the Chesapeake Bay, as has been done for Pennsylvania as mentioned by the previous speaker, at the level of 80 percent of phosphorus reductions. The policy calls for a more restrictive level of phosphorus control, where there is indication that embayments or tributaries to the Bay are still degraded even by the 80 percent reduction. We believe that this P-limitation will lead to improved water quality in the upper portion of the Chesapeake Bay.

Maryland's Lower Susquehanna River subbasin is of course of particular concern to the Susquehanna River Basin Commission. Again, the Chapter includes a subbasin description which I will read in part and in summary form, only:

"The river receives much waste input from domestic, industrial, agricultural and mining sources over its approximately 450 miles of length. There are 204 existing or scheduled municipal treatment plants in the basin. This includes 75 primary plants, 2 intermediate, 117 secondary, and 10 tertiary treatment plants.

The upper river above Conowingo Dam is under study due to the expansion of the Peach Bottom Nuclear Power Station 2.5 miles above the Maryland line. The increased thermal discharge is the main concern in the upper Conowingo Lake area. The increased nutrient load with resulting high chlorophyll a is also being studied.

The tidal portion below the dam is also affected by heavy algal blooms. Occasional high bacteria levels are evident during high flow periods on the Susquehanna mainstem.

In the fresh water tributaries only occasional violations of bacteria standards are found in sections of Broad, Conowingo, Octoraro and Deer Creeks. Most of these violations are due to septic tank failures and agricultural waste runoff..."

A new treatment plant recently placed at Stewartstown, Pennsylvania was a matter of controversy, or at least of considerable discussion, between the State of Maryland and the State of Pennsylvania. Let me say that the matter has been resolved and the States of Maryland and Pennsylvania are satisfied with the resolution of what we perceived as a water quality problem. Stewartstown now has a treatment system which protects what our fishery biologists have called very sensitive waters which serve as a habitat for the Maryland Darter, an endangered species and on the Federal endangered species list. During the last 10 years or so, I think six specimens have been actually observed.

(Comment - Dr. Maurice K. Goddard)
One was seen last year.

(Comment - Henry Silbermann)
One last year? Okay.

One of the more significant studies which has recently been made of the Chesapeake Bay is a mathematical modelling study by the Hydroscience Corporation.* The study was completed early in 1975, but the final report was revised recently. Dr. Robert Thomann and Dr. Donald O'Conner who are respected internationally for their competence in mathematical modelling of water systems, reported that an analysis of the data indicates an overall long-term trend during the summer months of increasing chlorophyll *a* concentrations in the Upper Chesapeake Bay, above the Potomac River. Upper Bay chlorophyll *a* averages during July 1950 were less than 5 micrograms per litre, while the averages of 15 or 20 years later were greater than 20 micrograms per litre.

"The more significant sources of nutrients to the Bay are from the Baltimore Harbor metropolitan area and from the Susquehanna River. The latter source under high flows may completely dominate the nutrient distribution in the Upper Bay."

"It has been estimated from the model verification analyses that 50 percent of the discharged total phosphorus load from the Baltimore Metropolitan Area to Baltimore Harbor and 10 percent of the discharged total phosphorus load from the Back River Wastewater Treatment Plant to Back River actually reach the

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* (Ed. Note: See Appendix B.)

Bay. It is suspected that algal settling in Back River and a combination of algal settling and chemical precipitation in Baltimore Harbor retain about 90 percent and 50 percent of the discharged total phosphorus loads within the River and Harbor areas, respectively."

"Analyses of past and present data together with the application of a mathematical model of nutrient-chlorophyll relationships appear to indicate that phosphorus is the primary nutrient that is limiting phytoplankton growth in the Chesapeake Bay. While nitrogen has an effect on growth at certain times and places in the Bay, the most significant nutrient appears to be phosphorus."

"On the basis of the above, the first step in nutrient removal for reductions in Bay chlorophyll should be directed toward phosphorus. The removal of nitrogen will probably not have as significant effect as the removal of phosphorus with respect to the Bay proper."

Exotic Water Pollutants

Now, on the subject of polychlorinated byphenyls mentioned recently so many times at so many meetings, I find so often that when we are using acronyms that even if we remember the proper order of the letters, we still don't know what it really means. What are we talking about when we say PCB? The first report of detection in the environment of polychlorinated byphenyls was in Sweden in 1966. So it's of rather recent concern. A year later there was a report it had been detected in the United States. Despite the fact that these materials have been in use for 40 years, we've only recently become concerned about the environmental hazards. The prime manufacturer of polychlorinated byphenyls is Monsanto, which markets a series of the PCB's under the trade name of Aroclor. A company bulletin lists many products in which PCB's may be used as elasticizers, flame retardants, insulating fluids, or to impart some other useful quality. Among the products are: natural and synthetic rubber, electrical products, floor tile, printer's ink for paper and fabric, brake linings, auto body sealants, paints, varnishes, waxes, asphalt and many adhesives and resins. The PCB's have also been recommended by Monsanto for mixing with chlorinated insecticides to supress their vaporization and extend their persistence. Since the first environmental detection of the polychlorinated byphenyls in the United States, in peregrine falcon eggs in 1967, their presence has been reported in many segments of the environment. To mention a few, gull eggs in San Francisco Bay, human milk in Colorado, human adipose tissues in many parts of the United States, fish in this area and fresh and saltwater aquatic life in various parts of the United States. Now,

quoting from a news release (and I'll be glad to make that available) on a study just completed for the Maryland Department of Natural Resources by the Resources Study Team of the University of Maryland's Department of Microbiology, the Chesapeake Bay Institute of the John Hopkins University and the Oceanic Division of the Westinghouse Electric Corporation, "... PCB's, persistent industrial chemicals, exist in the upper Chesapeake Bay, but at far below critical levels, according to a two year study submitted to the Department of Natural Resources.

The study, ordered by the Department in November of 1973, gives scientists and resource managers an early report on the levels of PCB's in the Upper Bay, the locations of the principal concentrations and the mechanism of transport for the chemical.

It gives DNR an assessment situation before PCB's become a problem as they reportedly have in other bodies of water in the United States.

For example, the study showed:

1. The highest level of PCB's found in Upper Bay shellfish was .15 parts per million, nowhere near the accepted critical level of 5 ppm.

2. The level of PCB's on sediments in the Upper Bay was .28 ppm, a full order of magnitude less than that existing in the critically saturated Hudson River. (Some portions of the Hudson ranged over 10 ppm).

The study determined that the Susquehanna River which delivers 90 percent of the fresh water contained in the Upper Bay also transported the preponderance of PCB's and chlorinated hydrocarbons found in the area.

Baltimore Harbor, the study said, was a "special case."

The harbor appears to have local sources of PCB's and chlordane. Sediment investigations suggest that the bulk of contaminants become trapped within or immediately outside the mouths of the harbor's tributaries."

We have instructed our Enforcement Division staff to immediately locate all sources of PCB products, or discharges from operations which contain PCB's, and to immediately begin an effort to mitigate that problem.

Surveillance and Monitoring

Obviously, surveillance and monitoring are an essential part of water quality management. I've mentioned before that we have an intensive survey program, compliance monitoring, and primary network monitoring. The Water Quality Services Division of our agency conducts both primary network and intensive monitoring. Compliance monitoring is part of the responsibility of our enforcement activities. During the fiscal year 1975, we conducted primary network monitoring at approximately 170 stations established to track over a long period of time, trends in water quality. (Is it getting better, is it getting worse, is it staying about the same?) This program is now held in temporary abeyance while we discuss with the EPA Regional Office what we think is a better balance between intensive and primary monitoring. We want to put our intensive surveys in each of the 19 subbasins on a five-year cycle to really study a subbasin, and come back five years later and study it again, so as to understand the system, and obtain information needed for modelling efforts.

Maryland's Oil Spill Prevention Program

In selecting some significant water quality management programs for discussion today, I would like to call attention to Maryland's oil spill prevention and control program. This State has pioneered in what we believe is a model effort, on which we reported at the 1975 Oil Spill Conference early in 1975. We obtained, through the State legislature, authority to establish an Oil Spill Disaster Containment, Clean-up and Contingency Fund. It is paid for by the petroleum industry. The oil terminals in the State are licensed; each pays from $250 to $5,000 annually into the fund. Approximately $250,000 a year is collected this way, permitting us to operate what is a comparatively modest oil spill prevention and control program. We have developed and constructed oil spill response units stationed in eight locations throughout the State. Each unit is never more than one hour's driving time away from any place of a spill. It can readily be hauled to a spill; it has booms on it; it has supplies on it (such as the absorbants which are commonly used); it has pumps on it, lights, and so forth. So we can respond to spills on inland waters quite well. And we have done this in the State for example, to the extent of 318 oil spills in the 1975 fiscal year. But we have a problem; we have a deep concern: what will happen on the open waters of the Chesapeake Bay when the weather is inclement; it is night; a tanker moves up the Bay toward Baltimore Harbor, gets into some difficulty, and we have a major spill? We've had large spills, but never a catastrophic spill. We are working on this problem through an ad hoc com-

mittee, on which the Coast Guard and other Federal agencies are also represented. We have already devised some improvements in the contingency plans for the region, and we are now specifying the kind of hardware that we want. The U.S. Coast Guard provides oil spill response in the form of so-called "strike teams" at three locations: the Gulf of Mexico, the Atlantic, and the Pacific. The Atlantic Strike team has its headquarters and equipment at Elizabeth City, North Carolina, hours away from the Chesapeake Bay or where the spill might occur in Maryland waters. We have not been satisfied with that, but we've not convinced the Coast Guard to establish a strike-team capability closer to the Chesapeake Bay.

A piece of oil spill clean-up equipment may cost a half million dollars. From our fund, which now can reach a maximum of one million dollars, we expect to buy some oil spill response hardware; we also expect the industry to supply some hardware; and are looking to the Federal government to give us some help also.

There is another thing that is of great concern to us, which has not been addressed adequately anywhere: the nonpoint source oil pollution problem. It is evident that the control of oil spills in Maryland is dealing with a tip of the iceberg. On the average, the oil spills in Maryland aggregate 100 to 120 thousand gallons a year. Most of our spills are 10 gallons or 100 gallons in size. We believe, under the strict notification requirements, all the oil spills, or virtually all, are being reported. So we get a lot of reports, and we know pretty well that most of the oil spills are being reported. But then we have looked into the matter of how much oil is actually lost to the environment in the State of Maryland. Now if you're like me, you'll be shocked by the figure. The estimate is that it may be as high as 20 million gallons a year. Conservatively, let's say, only 10 million gallons a year of waste oil is generated. We do not know the fate of the oil, we do not see it coming into any landfill areas or approved disposal areas. It is just "lost in the environment." It is used, and nobody knows exactly where it goes. It is a diffused source that has a substantial environmental impact and we're just beginning in this State to deal with that.

Conclusion

Now, in conclusion, I would like to indicate that this type of information, and additional information, is available in greater detail in several papers which I just presented to the Annual Meeting of the Citizens Program for the Chesapeake Bay. Mr. Chairman, that concludes my comment on selected water quality programs in Maryland's portion of the Chesapeake Bay, and other

Maryland waters. I'm prepared to answer questions.

Discussion

(Comment - Dr. Maurice K. Goddard)

I would like to quote one sentence from your 305(b) report. "Thus, there was an overall improvement in water quality observed in 1974." I think that's important. Those of us who work in government year after year after year (and we heard what New York, what Pennsylvania, and what Maryland is doing) -- sometimes you wonder whether we're making any progress. I think it's encouraging to see - when you're talking about the upper Chesapeake Bay, it does look like we're making progress. I know it isn't as fast as the public would like to have us go, but we're on the right track.

(Comment - Mr. Henry Silbermann)

May I make one other concluding comment? This is something I think is important, possibly you all would agree that it is important. We've adopted a motto for our oil spill control program. It says: "the best oil pollution control is the spill that never happens." It means that prevention is the key to all pollution control. I'm of the opinion, and I think really all of us must be of the opinion, that in order to control water pollution, we are going to have to prevent it at the source. We're doing very little in that respect right now.

(Comment - Dr. Maurice K. Goddard)

I would like to add that we (Pennsylvania) also have our 305(b) report -- Bureau of Water Quality Management, Publication #42, and ask Ted Clista about it or the requirements - the Federal law. Our report is also interesting reading on what is being done. I'm sure New York has the same thing.

(Comment - Unidentified Person)

About the oil that's lost in the environment -- is there a publication where you obtained your figures?

(Comment - Mr. Henry Silbermann)

The studies were made for the Maryland Environmental Service. I can -- if you leave me your name I'll give you the appropriate reference. The actual study stated that it was estimated that 20 million gallons were disposed of improperly a year. We believe that may be a little high by 10 million, and even that is too much.

(Comment - Dr. Maurice K. Goddard)

You know your local service stations dump oil, and everybody else dumps oil; it comes from the street, the highway system, that's why there is so much concern about pollution from storm drainage. Storm drainage, the first flush from a storm, it looks far worse once you get through the sewer plant, it causes real problems there ... they've proved that down at the EPA lab in Cincinnati.

(Comment - Mr. Paul McKee)

In Mr. Silbermann's talk, he referred to dual-authority in the State of Maryland between the Health Department and the Natural Resources. But I would point out that the Department of Natural Resources issues a discharge permit and specifies the conditions that must be met in the discharge and then the Health Department has the responsibility to review design of treatment facilities that meet the conditions of the discharge permit. So in essence, the Department of Natural Resources has the controlling role.

(Comment - Mr. Jerrald Hollowell)

Aren't the concentrations of PCB's found in shellfish an indication of what's been ingested over the years rather than what's just come down the river yesterday?

(Comment - Mr. Henry Silbermann)

Quite possibly. The analysis for polychlorinated biphenyls is somewhat complex. You have to be a good residue analyst to be able to do the analysis, and differentiate PCB's from dieldrin, aldrin and other peaks in the chromatograph. But the sources are only generally alluded to in the study report, so that it is quite possible that this has been an insult to the environment over a period of years. It is quite proper to say that this may be a long-term consequence of inaction or lack of control. What we probably can't control is what has already been spilled. What we feel we can do is to immediately reduce what is continuing to be disposed of to the environment. The problem of PCB pollution is an example, I feel, of our expanding understanding of water pollution control is ... Keep in mind that it has been just barely ten years since the first information on PCB residues in the environment came to our notice.

It is quite possible that we will learn more in the future about complex organic residues, for example, compounds from our modern technology, that are accumulating, and that we are not now able to detect or are not even looking for. Just because we are detecting a problem now does not mean it is of recent origin.

INDUSTRY VIEWPOINT

COAL MINING INTERESTS (DEEP MINING)

by
Henry Brown, President
Keystone Bituminous Coal Association

What I have to say has, in effect, been ratified already today following the discussion by the Colonel this morning. First, though, I would like to inject a very brief patriotic thought. Since this is the bicentennial year and these States are among the originals, I would like to offer a brief quotation from Betsy Ross. Standing beside the flag, in speaking to a group of townspeople, Betsy Ross said, "If this Nation remains free of foreign alliances, there need be no fear that alien forces will ever challenge this banner. It will never fade unless it's exposed to the power of our own Federal government." That was the inspired and dedicated remark of Betsy Ross. Mrs. Ross is co-chairman of the "Wallace for President Committee" in Keokuk, Iowa.

Her husband is also a very patriotic person, he shares her views. He's a Volkswagon dealer in Keokuk. He has a large farm outside the city and last year he got $33,000 from the Department of Agriculture for not growing soybeans, but he did well on his wheat. He sold it to the Soviet Union.

Last month Congressman Beard of Tennessee, in his speech to the House said that 6,000 regulations, each having the force, in effect, of law were adopted by government agencies in 1974. Not all of these were applied to water quality, but the people who have to work in that field certainly feel they have that many.

The dual permit system is cumbersome, costly and confusing. So it was discouraging to hear from Colonel McGarry this morning that is may take a year for Congress to do anything about it. Nevertheless, there may be areas where administration and enforcement can be reconciled and consolidated without the need for legislation. We will look at those in a moment.

I have here a quote from a recent speech by the Chairman of Bethlehem Steel. I won't read it but in effect he says that largely because of the conflict between Federal and State requirements, his company was delayed for five years in erecting a treatment plant, and that the cost went from $10 million to $27 million in that time. The coal industry is also encountering very long delays and unnecessary expense, in consequence of the dual permit system.

We think that a much more satisfactory system can be developed if the State and Federal governments are willing to work together. We feel that some phases of the acid mine discharge and solid waste program can and should be combined very quickly. I do not believe that there is a representative of the Mine Enforcement and Safety Administration here today, but there is no question that consolidation of the refuse pile and impoundment programs is possible and desirable. MESA is short of technical talent and maybe some of you folks are too. We think we can save there.

I do not think anyone will challenge the technical expertise of Dr. Goddard's staff. Nor the rigidity of Pennsylvania's regulations. We most certainly do not agree that all of the regulations imposed upon the coal industry by the Commonwealth are necessary. We believe entirely too much paperwork is involved. Here are 37 pages of forms, 37 that were sent to a company which wanted to open a shaft that would have no water discharge whatsoever. In addition, the company is required to make maps and other exhibits to accompany the forms. There should be enough information here for the Federal government and also for the United Nations, if it wants to get into the act.

We have other complaints about our good Secretary's Department but they are our people and we are stuck with them. Strike the last four words! We are willing to work with them!

We are willing to try to work with them. We also have the advantage of instant communication when we work with them. A situation that cannot be enjoyed by Federal agencies unless they open offices and spot new employees around the State. Something that this Nation just cannot afford. So if the Department is willing, why not allow it to assume at least part of the work and responsibility that Federal agencies have encroached upon? Why, for instance, can't the Corps of Engineers hand over its permit program to DER? The accomplishments so far that you have made in the technical field can be used very well by the groups that work together. I believe that such a procedure could be arranged if the State's program is considered adequate.

Pennsylvania has long been recognized as the leader in the ecological crusade. As for the competence of the DER staff, you could probably take your pick of all the engineers and technicians from all the other States, and you would have a hard time pushing anyone from Pennsylvania off the all-star team. We are convinced that economy and efficiency would be served by eliminating much of the current duplication. At the very least it would seem logical to get together and make an attempt in that direction. For this reason, I am using this occasion to ask Dr. Goddard if he would convene a meeting of representatives of all relevant Federal agencies, his own Department and the Keystone

Bituminous Coal Association. There is no guarantee of the success of such a meeting, but at least we will have the satisfaction of knowing that we have tried. And try we must, if we're going to save this old country by providing the energy it needs and doing something about the expanding cost of government. Thank you.

Discussion

(Comment - Dr. Maurice K. Goddard)

I think Hank, you understand on the NPDES permits, we're willing to do that, except we can't get EPA to bend on those civil and criminal penalties.

(Comment - Mr. Hank Brown)

Let's get together with EPA and find out where we're stuck. Maybe we can do something. And if you could get these other agencies, I believe we can find somewhere where we can save something.

(Comment - Dr. Maurice K. Goddard)

We agree. I'll be glad to get ahold of Dan Snyder and a few people and try to get together.

(Comment - Mr. Paul McKee)

Dr. Goddard, Mr. Brown suggested that you, as an individual representative, chair a meeting between all interested State and Federal agencies. Why couldn't we do that under the Commission rather than just the Commonwealth of Pennsylvania?

(Comment - Dr. Maurice K. Goddard)

We would love to do that. I think Mr. Brown wants to talk to more than just the Susquehanna Basin. I think the principles of course apply to all of Maryland and all of New York and all of Pennsylvania. Maybe that's a better way. We could have some input from New York, some input from Maryland, some input from Pennsylvania and if that's acceptable, to the other Commissioners, I think that would even be better. You would agree to that, wouldn you, Hank?

(Comment - Mr. Hank Brown)

I surely would.

INDUSTRY VIEWPOINT

ELECTRIC POWER GENERATING INTERESTS

by
Roger D. Ley, Manager, Water Resources Group
Susquehanna River Basin Electric Utility Group

One of the principal impacts of water quality regulations on the electric power industry is the limitation on the release to water bodies of heated water. We are not convinced that such regulations result in the optimum allocation of resources. Nevertheless, we have developed and are following procedures complying with those regulations. We believe that our procedures best address the many issues involved. We have two speakers who will elaborate on the issues. I'm not going to say much here. Our first speaker is Mr. David Helwig of the Engineering Research Department, Philadelphia Electric Company. He will trace the path of heat rejected from thermal stations through various means of heat disposal. Immediately following his presentation, Mr. William Strobel, Environmental Control Engineer, Pennsylvania Power and Light Company, will describe the industry approach to compensating for the consumptive use of Susquehanna waters.

I. AN OVERVIEW OF HEAT REJECTION FROM ELECTRIC GENERATING FACILITIES

by
David R. Helwig
Engineering Research Department, Philadelphia Electric Company

Background

The study, design and operation of cooling systems for modern power plants is a very complex and involved subject. I will attempt to provide you with a basic understanding of the principles involved, the state of the art, and the alternatives available for present and future use. In the interest of time, I will not address many of the details and subtleties but will instead refer you to the extensive body of literature that has evolved on the subject matter. The "Development Document for Proposed Effluent Limitations ..." published by the EPA in March of 1974 addresses the subject of thermal discharges in some detail and is very well documented --- listing over 400 relevant references.

In the production of electrical power a large portion of the fuel's energy must be discharged to the environment. The amount of heat discharged varies directly with plant capacity and inversely with plant efficiency. The greater the efficiency of a station the less heat that is wasted, that is, not converted to electricity. There is a thermodynamic limit to the efficiency that may be attained by any power plant. This theoretically "ideal" efficiency, called the Carnot Efficiency, is purely a function of the high and low temperatures between which the cycle operates. The temperature of the air and water in our environment determines the low temperature ($\sim$70°F.) while the temperature of the power plant's boiler or reactor determines the high temperature. The properties of present day materials limit this high temperature to about 1050°F. for a fossil-fired unit and about 560°F. for Light Water Reactors.

$$\eta_{Carnot} = \frac{T_h - T_1}{T_h}$$

T, temperatures = °F. + 460

Practically speaking, however, it is impossible to even approach this Carnot efficiency. In fact, the most efficient fossil-fueled power plants in the country operate at a thermal efficiency of about 40 percent. A comparison of Carnot and

typical plant efficiencies is provided in Table 1.

Table 1: Comparison of Carnot and Typical Steam Plant Efficiencies

Plant	Th, °F.	T1, °F.	Carnot Efficiency, %	Typical Plant Efficiency, %
Fossil Fired	1050	70	65	38
HTGR	1000	70	64	39
LWR	560	70	48	34

It is common practice in the power industry to rate a unit's performance in terms of its "heat rate", which is defined as the amount of heat (number of Btu's) required to generate one kilowatt-hour of electricity. The relationship between efficiency and heat rate is therefore:

$$\eta = \frac{3413}{\text{Heat Rate}}$$

3413 Btu = thermal equivalent of one KWHr

All of the thermal energy that is not converted to electricity within the plant must be rejected to the environment via one mechanism or another. In steam electric generating stations, by far the largest portion of this heat is transferred to the plant cooling water. Much smaller amounts of heat are rejected directly to the atmosphere due to various in-plant losses. In fossil-fired steam plants some heat is rejected directly to the atmosphere via the stack. Generally, between 8 and 15 percent of the fuel's energy is exhausted in this manner, as the efficiency of boilers ranges between 85 and 92 percent. Gas or combustion turbines, of course, reject all of their waste heat directly to the air and, therefore, do not require an external source of cooling water. A comparison of the heat rejected from the various types of generating stations is presented in Table 2.

Table 2: Comparison of Heat Rejection From Different Types of Power Plants

	η (%)	Heat Rate (Btu/KWHr)	Heat Rejected (Btu/KWHr) to Air	Heat Rejected (Btu/KWHr) to Cooling Water
Oil-Fired Steam (low sulfur)	39	8,750	875	4,460
Coal-Fired Steam (with SO_2 removal)	37.5	9,100	910	4,780
HTGR	39	8,750	---	5,340
LWR	34	10,000	---	6,590
Combustion Turbine Simple Cycle	24	14,000	10,590	---
Regenerative	34	10,000	6,590	---
Combined Cycle	36	9,500	2,750	3,310

For the purpose of this comparison I have used nominal "design" heat rates and have neglected the relatively small amount of heat transferred radiantly to the air due to in-plant losses. At this point there are several interesting generalizations that can be made with regard to efficiencies and heat rejections from the various types of generating stations:

1) Light Water Reactors (BWR & PWR) will reject approximately 50 percent more heat to the condenser cooling water than will a fossil-fired unit of the same size. This is due to lower plant efficiencies and the fact that there is no heat loss via a stack from a nuclear boiler.

2) The SO_2 removal equipment required for new coal-fired stations reduces overall plant efficiencies by about 1.5 percent. Without this equipment coal-fired units can be designed with the same efficiency as a unit fired with low sulfur oil.

3) The HTGR can operate at an efficiency equal to that of the most efficient fossil units. A 40 percent efficiency for these units appears to be readily obtainable but the additional capital expenditure required is not justifiable at the present time.

The results of this comparison are valid as long as the steam generating units utilize the same type of cooling water system. As such, they should be considered to be relative.

There are three basic types of circulating water systems

that may be used to reject the waste heat from a power plant to the surrounding environment; - once-through, once-through with supplemental cooling, and closed-loop. Until fairly recently, the vast majority of power plants in the United States used conventional once-through cooling. During the past few years however, the emphasis has shifted toward the use of closed-loop systems. This shift is primarily due to the adoption of more stringent thermal pollution regulations by the various State and Federal agencies, the increased unit capacities, and the increasing difficulty in finding suitable sites for plants utilizing once-through cooling. In fact, with the adoption of the "Point Source Standards for Steam Electric Generating Stations", which were developed pursuant to the 1972 Amendments to the Federal Water Pollution Control Act, new generating stations (and some existing ones) must be designed (or modified) to utilize closed-loop cooling systems. Exceptions to this rule will be granted where the utility can prove that this requirement is "more stringent than necessary for the protection and propagation of fish, shellfish, and wildlife ..." This should not be considered a definitive mandate for the use of closed cycle cooling systems. Many utilities are taking advantage of their appeal priviledges under Section 316(a) and, in fact, the EPA has estimated that only about 40 percent of the capacity installed through 1983 will be required to utilize closed loop cooling. Thus, the alternative types of cooling systems available to the industry still have an important role to play in the effective use of our environmental resources.

The selection and design of any specific circulating water system involves a complex optimization study that includes the capital and operating costs of each component, local meteorological data, local topography, ambient water temperatures, costs of fuel and replacement energy and of course, any relevant environmental or legislated constraints. Regardless of the type of design of the cooling system, all of the waste heat is eventually transferred to the atmosphere by evaporation and sensible heat transfer. The general features and characteristics of each type of cooling system are described below.

Once-Through Circulating Water System

In a once-through circulating water system a) cool water enters the plant from a lake, river, or other large body of water, b) is pumped through the condenser, where it is heated, c) is discharged at a point downstream of the plant where it is mixed with the remaining flow, or body of water, and d) gradually gives up its heat to the atmosphere and approaches water's equilibrium temperature.

The temperature increase experienced by the water as it passes through the condenser is directly proportional to the heat transferred to it and inversely proportional to the quantity of water being used.

$$\Delta T = \frac{H}{224640\ (Q)}$$

T, °F.
Q, $ft.^3/sec.$
H, Btu/Hr.

Thus, within certain limits, for a given rate of heat transfer, one may either heat a small quantity of water a great deal, or a large quantity of water a small amount. In once-through circulating water systems the temperature rise is usually between 10 and 30°F. and the pumping rate varies from 300 to 1100 gpm per megawatt of plant capacity.

The heated water is discharged to the receiving body of water, via a canal or discharge pipe, such that recirculation and erosion of the stream bank and bottom are minimized and effective mixing is induced. Many older stations utilize low velocity surface discharges. Newer and larger units are utilizing such devices as high velocity submerged jets, multiport submerged diffusers, and offshore discharges to promote rapid mixing and limit the extent of the areas affected by high excess temperatures. The particular type of discharge employed determines the "near field" distribution of excess temperature (the difference between the induced water temperatures and the equilibrium temperature of the water). The total amount of heat discharged to the water body is, of course, not diminished.

The thermal energy imparted to the receiving body of water by any thermal discharge is eventually transferred to the atmosphere regardless of the near-field temperature distribution, by back-radiation, conduction, convection and evaporation due to the driving force of the excess temperature. The consumptive water loss due to the evaporative component of this surface heat exchange process can be estimated from basic heat budget considerations. The final result of a fairly straight forward derivation is an equation, used by the DRBC and the Delaware River Basin Utilities, for the determination of the increased evaporation caused by a thermal discharge. The use of this equation requires knowledge of only the average surface water temperature, the average dew point temperature, and the average wind speed.

$$C = \frac{4.45}{L/1000} \left(\frac{b(K-15.7)}{(.26+b)K}\right)$$

C, cfs/10^9 Btu-Hr^{-1}
L, latent heat of vaporization
K, surface heat exchange coefficient
b, slope of vapor-pressure/temperature curve

An example of an analysis of the yearly variation of this evaporative loss coefficient, C, is presented in Table 3. The calculations are based on long term average monthly meteorological data and water temperatures at Philadelphia. The results may be considered representative of those that would be found for any site on the lower reaches of the Susquehanna or Delaware Rivers. By analyzing the actual monthly data for the past seven years, it has been demonstrated that the actually experienced evaporation coefficients vary only slightly above and below the long term monthly values (max. deviation 10 percent). The variation experienced is illustrated in Figure 1. This analysis also revealed that the monthly factors combined such that the greatest yearly deviation was less than two percent greater than the yearly average factor based on long term records.

It should be noted that the mathematical formulae used to predict instream evaporation represent the state of the art and are by no means exact. Considerable discussion of the inaccuracies inherent in these calculations is contained in the literature. Considering the inaccuracy of each component of the final equations, an accuracy of between 10 and 15 percent can be expected from these evaporative loss predictions. These limitations should be born in mind by all those involved with their use, otherwise, considerable expense, time, and effort may be wasted unnecessarily. The results of our analyses indicate that the use of many methods of accounting, which would be more complicated than the use of long term average factors, can not be justified on the basis of improved accuracy.

For estimating purposes it is only necessary to multiply the "C" factor by the unit's design rate of heat rejection and its load factor to determine the amount of instream evaporation. For other purposes it may be convenient to utilize the following relationship which involves only the amount of generation during the time period of interest and the heat rate of the turbine.

$$MG = C(KWHr_g)\ (2.7 \times 10^7)\ (HR_t - 3413)$$

TABLE 3

EVALUATION OF EVAPORATIVE LOSS AT PHILADELPHIA, PA.

	Wind Speed (mph)*	Water** Temp.(°F)	Dew Pt.*** Temp.(°F)	Ave. Temp.(°F)	b (mmHg/°F)	L (Btu/lb)	K Btu/ft^2-day°F	C ($cfs/10^9 Btu.Hr.^{-1}$)
January	10.3	42	23	32.5	.19	1070.1	81	1.41
February	11.2	36	18	27.0	.17	1073.6	84	1.33
March	11.5	40	37	38.5	.23	1071.3	95	1.63
April	11.0	47	43	45.0	.28	1067.3	100	1.82
May	9.7	58	52	55.0	.40	1061.0	106	2.16
June	8.8	72	67	69.5	.65	1053.2	129	2.65
July	8.1	80	67	73.5	.73	1048.6	131	2.75
August	7.9	81	68	74.5	.75	1048.1	131	2.77
September	8.3	77	59	68.0	.62	1050.4	120	2.59
October	8.9	70	50	60.0	.48	1054.3	109	2.34
November	9.7	60	37	48.5	.32	1059.9	94	1.93
December	10.1	48	28	38.0	.23	1066.7	84	1.59
Average	9.6	59.3	45.8	52.5	.36	1060.1	100	2.07

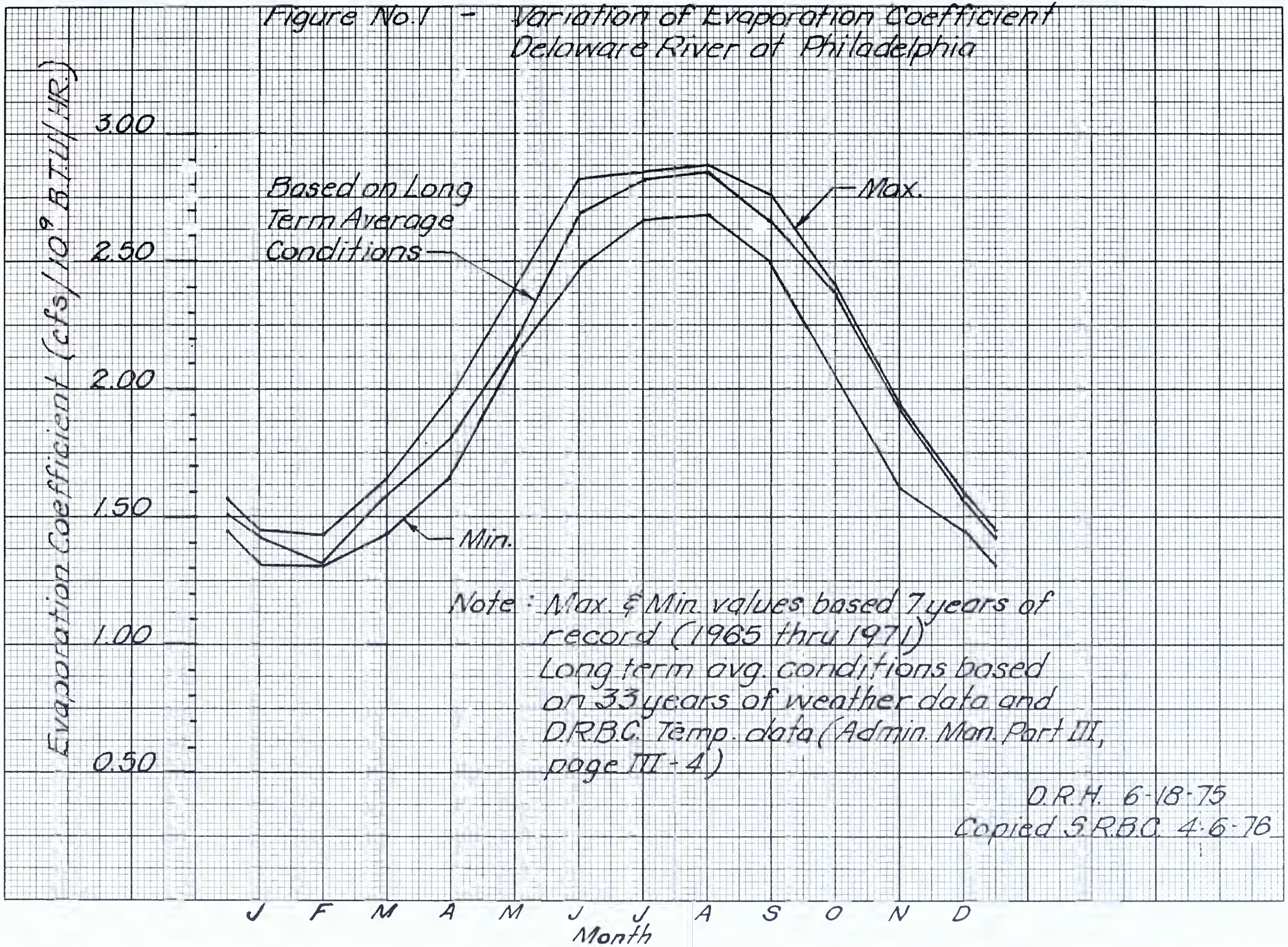
* mean wind speed; based on 33 years of record at Philadelphia, Pa.; published in Local Climatological Data - Phila., Pa. by U.S. Dept. of Commerce.

DRH:drd
May 5, 1975

** ave. daily temp.; Delaware River, Zone 4; based on 1961-66 data published in Nov. 24, 1970 DRBC Administrative Manual, Part III (page III-4).

*** ave. monthly dew pt. temp.; published in Local Climatological Data - Phila., Pa. by U.S. Dept. of Commerce.

Figure No.1 - Variation of Evaporation Coefficient
Delaware River at Philadelphia



Note: Max. & Min. values based 7 years of record (1965 thru 1971)
Long term avg. conditions based on 33 years of weather data and D.R.B.C. Temp. data (Admin. Mon. Part III, page III-4)

D.R.H. 6-18-75
Copied S.R.B.C. 4-6-76

For a "rule of thumb" estimate it may be assumed that, in the N.E. United States, approximately 50 percent of the heat discharged to the water will be transferred to the atmosphere by evaporation from the water surface. This is equivalent to assuming a "C" factor of about 2.2 ("C ave." = 2.07 from detailed analysis).

Once-through cooling is most often the simplest and most economical method of condenser cooling. In addition, as shall be demonstrated in the subsequent discussion, it requires the least consumptive use of water. Unfortunately, the availability of large supplies of cooling water is very limited and, since all of the waste heat is discharged directly to the water, once-through cooling is the most likely to violate the thermal standards for the receiving body of water.

Closed Loop Circulating Water System

Closed loop circulating water systems circulate the cooling water first through the condenser for heat removal, then through a cooling device where the heat is released to the atmosphere, and finally, the cooled water is returned to the condenser. The transfer of heat to the atmosphere is accomplished through the use of one of the following devices:

1) Wet Cooling Towers
2) Cooling Ponds or Lakes
3) Spray Ponds
4) Dry Cooling Towers
5) Wet/Dry Cooling Towers

Each of these devices, with the exception of the dry cooling tower, relies on evaporative cooling to transfer some portion of its rejected heat to the atmosphere. In general, a greater percentage of the heat is rejected by evaporation in these closed loop systems than in a once-through system. Before discussing each of these different devices, there are several common characteristics that should be discussed.

Since the naturally occurring chemical and solids are left behind when water is evaporated, the water quality of a closed system would constantly deteriorate if there were not a certain amount of blowdown and makeup provided. The amount of blowdown and makeup required to maintain an acceptable quality of the circulating water is dependent on the rate of evaporation and the quality of the makeup water. An "acceptable" quality is that which is required to prevent excessive corrosion, fouling of heat transfer surfaces, and/or enable the blowdown to meet any chemical limitations on the discharge. We usually speak in terms of a "concentration factor".

$$CF = \frac{Q_{makeup}}{Q_{blowdown}} = \frac{Q_{evap} + Q_{blowdown}}{Q_{blowdown}}$$

Perhaps this concept can best be illustrated by an example:

> Suppose that the condenser tubes in our closed-loop evaporative cooling system will foul if the total dissolved solids in the circulating water get above 1500 ppm. Since the Creek River, the source of water for our plant, normally contains about 500 ppm of dissolved solids we can only tolerate a concentration factor of 3. Thus, if we were evaporating 50 cfs we would have to blowdown 25 cfs and makeup 75 cfs.

$$Q_{evap} = 50$$

$$CF = 3$$

$$Bd = \frac{Q_{evap}}{CF-1} = 25$$

$$Q_{mu} = Q_{bd} + Q_{evap} = 75$$

In reality, this type of consideration is not nearly so simple. The acceptability of the quality of the circulating water is dependent on the interaction of about a dozen different water quality parameters which determine the corrosive or scaling tendency of the water. Suffice it to say that an acceptable concentration factor in this region will probably be between 2 and 5. It is important to note that the chemicals and solids in the blowdown will be more concentrated than in the water source. This, of course, does not represent a net addition of either chemicals or solids to the receiving water body but, rather, a local change in their concentrations. The magnitude of this local change will diminish with distance from the discharge due to dilution by mixing with the ambient water.

It is not practical to design a closed-loop cooling system such that all of the waste heat is rejected to the atmosphere and the circulating water reaches its equilibrium temperature before being returned to the condenser. The actual performance of a cooling system is measured in terms of the cold water's "approach" to the wet bulb temperature for evaporative systems, or the dry bulb temperature for a system utilizing dry cooling towers. The temperatures throughout the circulating water system

will increase until the difference between them and the equilibrium temperature is great enough to reject all of the waste heat to the air before the water is recirculated. Condenser temperature rises, and cooling tower ranges, are generally higher than for once-through systems (25° to 35°F.). These higher water temperatures will cause higher turbine backpressures which will, in turn, cause reduced turbine efficiencies and generating capacities. The relative effects of increased backpressures and auxiliary power requirements of additional pumps, fans, etc. on a plant's heat rate can be demonstrated, approximately, as a penalty factor.

Cooling Water System	Approximate Heat Rate Penalty Factor
Once-Through	base
Cooling Pond	.2%
Wet Towers, nat. draft	.7%
Wet Towers, mech. draft	.8%
Dry Towers, nat. draft	15.3%
Dry Towers, mech. draft	17.4%

This increase in heat rate, and the resultant lower efficiency and more expensive power, is indeed significant when one considers the tremendous number of kilowatt-hours that are produced over the 30 to 40 year life of a plant. The penalties can be much more severe than those listed when an old station, not designed for high backpressure operation, is backfitted with a closed-loop system.

As a result of the higher temperatures in the circulating water system, there will be some heat discharged with the blowdown even if it comes from the coldest part of the system. The amount of heat released in this manner is relatively small and can, in most cases, be considered a localized effect like the increases in concentration. Even so, diffusers and jets are gaining acceptance as an aid in rapid mixing to minimize the affected area.

Wet Cooling Towers

There are a number of different types and varieties of evaporative cooling towers currently in use. The most obvious distinction is between natural draft, or hyperbolic towers and mechanical draft towers. Finer distinctions can be made based on the arrangement of the packing or fill material (counterflow or crossflow) and the arrangement of fans (whether for induced or forced draft) but such distinctions are of no significance in this discussion.

In mechanical draft cooling towers large fans are used to either induce or force air through the tower so that the air contacts the hot water droplets as they travel downward through the fill. Natural draft towers require no fans, but use the tower's height to produce a "chimney effect" which induces air flow through the tower. These hyperbolic towers may range in size up to 400 feet in diameter at the base and over 500 feet tall. Drift eliminators, which are really no more than baffles to separate water droplets from the main air stream, are provided in all modern wet cooling towers. Typically, towers will be guaranteed to prevent the drift loss of more than 0.01 percent of the water being passed through them. Lower drift losses can be achieved, for a price.

All of the heat rejection takes place within the cooling tower by direct contact of the water and the air. Most of the heat, approximately 75 percent on an average annual basis (varies between 55 and 95 percent), is transferred to the atmosphere by evaporation. The exact percentage is dependent on the local meteorological conditions and water temperatures and the design parameters of the specific cooling water system. For a rule-of-thumb estimate, it may be assumed that there is about one percent evaporative loss per 13°F. cooling range.

Cooling Ponds

Cooling ponds are normally artificial lakes constructed either by the impoundment of a stream or by excavation. Heat is transferred to the atmosphere by surface heat exchange processes, just as in the case of once-through cooling. In fact, if a cooling pond is designed with a thermal loading of less than about 1/3 MW_e per acre of pond surface, the cold water temperature will be close to that available were once-through cooling used. In most instances, cooling ponds must be designed for heavier heat loads than this in order to limit land requirements. The optimum size of a cooling pond is determined by balancing the cost of the developed land and the cost penalties involved with the operation of smaller ponds. If real estate prices and development costs are low enough, a circulating water system utilizing an optimum cooling pond design may have a lower annualized cost than an equivalent system using cooling towers or spray ponds. This is generally not the case, however, in the Middle Atlantic States.

Roughly 70 percent of the heat will be transferred from the pond's surface to the atmosphere by forced evaporation. However, since the surface of the pond was created for the use of the power plant, natural evaporation from the pond must be considered an additional component of the system's consumptive

use. When this natural evaporation is included, cooling ponds generally have even higher consumptive losses than evaporative cooling towers. The exceptions to this general rule occur in arid regions, like the southwest, where makeup water must be stored to supplement low flow periods. In these cases, the evaporative losses of the storage reservoir plus the cooling tower may be greater than the total losses from a cooling pond.

Spray Ponds

Spray systems can be utilized to reduce the large area required by cooling ponds by up to a factor of ten. The condenser cooling water is sprayed through the air in order to increase the surface contact of the water with the air. Increased pumping power will be required by the sprays and the evaporative losses will be about equal to those of evaporative cooling towers. Drift losses will, in general, be higher than for cooling towers as the losses will range from 0.1 percent to over one percent depending on the wind speed. Several manufacturers are currently marketing floating spray modules. These modules have, as yet, received little application in closed-loop circulating water systems. Fixed spray designs are currently being used as backup heat removal systems, ultimate heat sinks, for several large nuclear stations (Rancho Seco, Susquehanna, Limerick). These spray ponds are designed to handle the emergency shutdown cooling requirements. The heat rejected for this type of operation is typically on the order of five percent of the normal condenser heat rejection.

Dry Cooling Towers

Dry cooling towers may be either mechanical or natural draft. Their application to electric generating stations has been very limited. A dry cooling system operates on the same principle as an automobile radiator. The circulating water never comes in contact with the air but, rather, is passed through finned heat exchanger tubes within the cooling tower. There is, of course, no consumptive use of water as in an evaporative system. Another type of dry cooling system, known as an air cooled condenser, condenses steam directly within the finned tubes.

Equipment costs for this type of cooling system are much greater than for wet cooling towers. In addition, since the cooled water temperature can at best approach the dry bulb temperature, condensing temperatures and turbine back-pressures are considerably greater. Dry cooling towers will not see widespread application until the state of the art in

turbine design has advanced to the point where very high backpressures are acceptable.

Wet/Dry Cooling Towers

The relatively new wet/dry type cooling tower combines both cooling principles of evaporation and convection in one unit. The tower is composed of a wet section and a dry section through which water is passed either in series or parallel. An air flow is induced through the tower using either the mechanical draft or natural draft concept. An advantage of this type of tower, when compared to the wet type, is that under some conditions and within limits, the amount of visible plume and water evaporated can be controlled. Capital and operating costs for this system are considerably greater than those for wet cooling towers. Since a significant part of this system utilizes a dry tower, many of the inefficiencies and undesirable operating characteristics associated with the totally dry tower remain.

Once-Through With Supplemental Cooling

Cooling towers and spray modules are sometimes used to remove a portion of the heat from the condenser cooling water before it is discharged from an open system. Since the cooling "range" is dependent on the weather conditions, the cooling devices will remove more heat in the summer months than in the winter. While this type of system rejects less heat to the receiving body of water than a once-through system, it requires the withdrawal of the same quantity of water. The amount of heat transferred by evaporation, and therefore the consumptive use, is between that of once-through and closed-loop systems.

The range of evaporative losses for once-through, "helper", and closed-loop cooling systems is illustrated in the following analysis of three alternative cooling systems studied for Peach Bottom Units 2 and 3 (see Table 4). The analysis is based on average monthly meteorological conditions and typical cooling tower performances. The rate of evaporation for the "helper" system is about 20 percent greater than for a once-through system. The rate of evaporation for a closed-loop system is about 60 percent greater. On an average annual basis, at an 80 percent load factor, this difference amounts to about 1.2 and 3.8 billion gallons of water respectively.

An additional type of cooling water system that is worthy of note is the Open/Closed, or Variable Blowdown, System. This type of system is designed with the flexibility to operate in open, closed, or intermediate modes of operation. Thus, one can take full advantage of any permissible mixing zone or variable environmental constraints.

TABLE 4

Peach Bottom Units No. 2 and 3*

Comparison of Evaporative Losses for

Alternative Cooling Systems

	Once-Through Surface Evap. (cfs)	5 Helper Towers Tower Evap. (cfs)	5 Helper Towers Surface Evap. (cfs)	5 Helper Towers Total (cfs)	Closed-Loop Total Evap. (cf
January	23.5	10.5	16.8	27.3	46.8
March	26.6	9.5	20.7	30.2	46.8
May	36.0	26.6	19.3	45.9	62.4
July	45.4	37.5	15.9	53.4	62.4
September	42.5	29.3	20.7	50.0	62.4
November	31.3	10.5	23.6	34.1	46.8
Average Rate (cfs)	34.2			40.1	54.6
(gpm)	15,350			18,000	24,500
Annual Total @ 80% L.F. (MG/yr.)	6,454			7,567	10,300

* BWR - 1065 MWe each
Circulating Water Flow = 3350 cfs
Condenser ΔT = 20.8 °F

Prepared by: D. R. Helwig
May 12, 1975

References: Brady, D.K., Edinger, J.E., Geyer, J.C.; Heat Exchange and Transport in the Environment; EPRI Publication No. 74-049-00-3.

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II. SUSQUEHANNA RIVER BASIN ELECTRIC UTILITY STEAM GENERATING STATIONS ENVIRONMENTAL CONSIDERATIONS FOR WATER-RELATED FACILITIES

by
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Pennsylvania Power and Light Company

The previous presentation briefly covered a number of considerations that need to be a part of the decision-making process for the selection of the type of cooling water system to be used for a steam electric generating facility. Regardless of the decision, with present day technology, the system will require pumping water from and discharging water to a stream and in the utilization process will be a consumer of water. The task then becomes one of determining and utilizing a practical system that will achieve a reasonable balance between the effect on the water resources and the effectiveness of the resources dedicated to power supply.

Background on State Regulation

State regulatory agency requirements have had the greatest influence on these decisions for quite some time, and more recently the Federal agency requirements have become a major consideration. With about 76 percent of the Susquehanna River Basin in Pennsylvania and the writer having familiarity primarily with the Pennsylvania regulations, all references to State regulatory agency requirements are based on implementation of the Pennsylvania Clean Streams Law of June, 1937 and subsequent amendments. The Clean Streams Law defined water pollution as a contamination of the Commonwealth streams which creates a nuisance or is injurious to the public health or the uses of the stream.

The Pennsylvania water quality criteria established to implement the Clean Streams Law are based on existing stream water quality and stream uses. The Department of Environmental Resources (DER) adopted standards for effluent consistent with stream water quality criteria based on the pollutant load of a particular stream and the assimilative capacity of the stream at the critical flow. The critical stream flow considered is the average minimum flow that occurs during seven consecutive days of any one year and having a recurrence interval of ten years. The Pennsylvania Electric Utilities, in general, have found this approach acceptable and adequate for all the assigned uses of a particular stream.

Background on Federal Regulation

The October, 1972 Federal Water Pollution Control Act Amendments (P.L. 92-500) established the National Pollutant Discharge Elimination System (NPDES) to be administered by the Environmental Protection Agency (EPA). Under P.L. 92-500, EPA has established effluent guidelines for 27 waste sources, including steam electric generating stations. Essentially at this time, EPA is evaluating each particular discharge in light of the best practical treatment available to control that process waste, and the DER is evaluating all discharges based on stream use and critical stream flow.

In evaluating steam electric station discharges, the EPA has emphasized the protection of the aquatic community from thermal discharges and has established closed cooling water systems, in most instances, as both the best practical control technology currently available and the best available technology economically achievable. However, the EPA has recognized that in certain instances, other type of cooling may be a viable alternative and, therefore, has established under P.L. 92-500 Section 316(a) an exemption from the closed cooling water technology provided that the owner or operator of the facility can demonstrate that this technology is more stringent than that which is required to assure protection and propagation of a balanced, indigenous aquatic community.

Section 315(b) of P.L. 92-500 addresses the location, design, construction and capacity of cooling water intake structures. It requires that a study be conducted on all existing and new intake structures to show that the intake provides the necessary protection for the propagation of a balanced indigenous population of established aquatic communities.

Preliminary guidelines have been issued for both 316(a) and 316(b) studies, and the work involved requires the acquisition of plant data, biological data, and environmental data over a reasonable period of time (at least one year) and correlation of these data before any conclusion can be drawn. In most cases, the work involved requires expertise that necessitates retaining consultants to assist in the collection, interpretation and compilation of data. The complexity of these studies is indicated in the results of an Edison Electric Institute questionnaire which indicated that for a 1600 MW plant, the cost for a 316(a) study could range from $133,000 to $3,200,000 and for a 316(b) study could range from $59,000 to $1,300,000.

Cooling Water Situation in the Susquehanna River Basin

In some areas of the Susquehanna River Basin, critical

flows dictate the use of closed cooling water systems for large steam electric generating stations. The unavailability of large land areas with suitable topography dictates that cooling be accomplished by cooling towers rather than cooling ponds or canals. Present day technologies and economics require that these be "wet" cooling towers, either natural or mechanical draft, which dissipate heat to the atmosphere by evaporation of appreciable quantities of water.

The estimated combined average water consumption of generating stations planned and proposed for the period 1975 to 1989 in the Susquehanna River Basin exceeds 150 cfs, as given in the 1975 Susquehanna River Basin Master Siting Study. An additional 100 cfs or more will be consumed by stations envisioned for installation beyond 1989. For comparison, this anticipated ultimate water consumption of at least 250 cfs is approximately 10 percent of the critical stream flow of the Susquehanna River at the Marietta, Pa. gaging station.

Consumption of this amount of water would appreciably affect stream flows, particularly when natural flows are low. To maintain suitable water quality downstream from the point of consumption, compensating releases from reservoir storage would need to be made when flows would be low.

The Susquehanna River Basin Comprehensive Plan (Section III.A.13) states that "compensation shall be required for consumptive uses during periods of low flow." The electric utilities have committed to compensate for consumptive use of water at all new facilities in the Basin during low flow periods. An adequate amount of storage in reservoirs would be needed to provide capability to compensate in the amount of the consumptive use. Storage between 50,000 and 120,000 acre feet, depending on criteria adopted for the low flow requirement, is required in the basin to guarantee compensating releases totaling 250 cfs during a recurrence of the record drought year (1964).

Position by Electric Utilities on Basin Cooling Water

It is the position of the electric utilities in the basin that the water resources of the basin are best developed by well-planned, economically justifiable, multi-purpose reservoir projects. The utilities recognize possible advantages to participate either in new multi-purpose projects or in the modification of projects existing or under construction to provide compensation storage in the amounts required. As requested by the Susquehanna River Basin Commission, the Corps of Engineers is considering the inclusion of storage for compensation for consumptive water use in multi-purpose projects

under study in the current Flood Control Review Study. However, the long time interval required to have a Corps multipurpose reservoir project in-service does not permit considering its use by generating units now under construction. Likewise, the modification of Corps projects, existing or under construction, involves substantial time for Congressional authorizations, for economic and environmental studies, and for preparation of engineering plans and construction. To provide for the near future needs, it appears that the alternative is to develop the compensation storage needed in a utility-constructed reservoir and thereby have the storage available more closely to the in-service date of generating facilities.

Study thus far indicates that sites best suited as utility-constructed makeup reservoirs from the combined standpoints of land acquisition, environmental impact and cost are generally on small tributary streams, the drainage areas of which are insufficient to guarantee refill of the reservoir following drought years. Provision for refill by pumping water from a larger stream nearby needs to be made, including a pumping station and pipeline. To minimize environmental impact, careful selection of pump station location and pipeline alignment is required. Where possible, the pipeline might follow existing rights-of-way, but in any event, the right-of-way would need to be kept accessible. Applicable environmental regulations would need to be followed during project construction and operation.

Whether reservoirs to provide compensating storage are constructed by companies or by other entities, and whether they be small or large, their existence will involve certain environmental advantages and disadvantages. Properly pursued, we believe that the advantages can far outweigh the disadvantages. Briefly, let's take a look at this.

Concern has been expressed by some that reservoir construction is a disadvantage because such construction involves a change from that which existed before. For those who would maintain conditions exactly as they are today, a change may be a disadvantage. Because a democracy measures the public interest in terms of that which affects the majority, and because the majority of our population would be reluctant to give up the changes which have occurred since this country was a wilderness, there seems to be little justification in accepting the argument for preservation if significant benefits can be demonstrated.

During the period when change is being effected, a different environmental effect -- that related to the disturbance caused by construction activities -- occurs. Although such activities have some economic benefits and are facinating to some observers, the environmental impact caused by the noise, traffic and dust

is undesirable. However, steps can be and generally need to be taken to comply with regulatory requirements and to confine those undesirable effects to a very small area and to prevent their impingement upon the majority of people.

Reservoirs do remove land areas from such functions as providing a habitat for various flora and fauna, serve as a forest, or serve as an agricultural area. Considerable doubt exists though that animal life of any type abounds in the Susquehanna Basin in such large numbers that the available habitat limits the total number of individuals. This fact, coupled with the extremely small proportion of such habitat occupied by a reservoir, provides reasonable assurance that most of the life displaced by reservoir construction will find suitable habitat elsewhere and that the total population will not be materially affected. Inundated farm land or forest land cannot be replaced, but again the total effect is relatively small and more than compensated by the ability of the reservoirs' output to produce goods and services.

A reservoir often affects fishery resources substantially. The water area and water volume within which fishes may be produced is increased many fold, thereby tending to increase significantly the fish productivity of the reach. Sometimes the productivity per acre of water is reduced, but such reduction is likely to be more than compensated by the increase in area. The character of the fishery may also change. In some instances, the predominantly cold-water fishery may give way to a warm-water fishery. When the original stream upon which a reservoir is built is so small that trees along its banks shade the water from sunlight, widening of the water surface caused by reservoir construction may result in some heating of the water, with a corresponding change in the type of fishes to be found both within the reservoir and for a limited distance downstream. Likewise, the angler may change from one who uses a fly rod and waders to one who fishes from a boat. In general, larger numbers of fishermen and larger catches are likely to result.

A reservoir is likely to change the quality of water. It may trap nutrients and may increase development of various forms of algae. Some algae growth in a reservoir is normal and may be desirable as some types of algae provide nutrients for fishes. However, uncontrolled algae growth could cause a nuisance but, again, can be mitigated.

Reservoirs for compensating purposes must experience significant variations in water level in order to draw upon the storage which makes such compensation possible. Variations may be beneficial as change in water level is desirable in minimizing mosquito production and in controlling excessive growth of rooted aquatics. Nevertheless, large drawdown can

expose bare and sometimes silt-covered surfaces. Fortunately, severe drawdown rarely occurs and, generally, during seasons when recreational use is small and snow cover may exist.

The primary purpose, and therefore the major advantage of compensating reservoirs, is to permit the consumptive use of a valuable resource without adversely affecting downstream low flows. That purpose is achieved by collecting higher flows, including flood flows, which would otherwise pass uselessly to the sea and holding them until needed.

Although the reservoir release is generally intended merely to augment flows sufficiently to compensate for consumptive use, such release further increases the low flow in the reach between the reservoir and the point of use. Additionally, continuous minimum release from the reservoir in a quantity determined by drainage area at the dam would improve the low flow of the stream.

Nearly every reservoir designed for flow augmentation purposes provides significant opportunities for recreation. Boating, fishing, water skiing, and picnicking are some of the activities generally possible at such locations.

The streams of the Susquehanna River Basin represent a resource which can be used for the benefit of the people. To neglect a valuable resource is to deny to the people some of the benefits which they might otherwise enjoy. Obtaining the benefit of any resource is likely to involve some difficulties and some disadvantages. The utilities recognize a need to maintain suitable water quality in the Susquehanna River Basin and have agreed to provide storage from which compensating releases during low flow periods can be made for consumptive water use at steam electric generating stations. Compensating releases and approved treatment of generating station discharges, we believe, will assure that operation of those stations will not impair downstream flow or water quality. Our position is that development of electric power facilities utilizing water for cooling purposes and of the associated compensating reservoirs results in far more advantages than disadvantages.

Discussion

(Comment - Dr. Maurice K. Goddard)
You said that the wet tower used 50 percent more water than once-through cooling.

(Comment - Mr. David R. Helwig)
Yes sir, on an average annual basis.

(Comment - Dr. Maurice K. Goddard)

I don't quite understand the reasoning behind it. If you put in once-through cooling, when that water goes into the river (or any body of water), doesn't it lose its heat primarily by evaporation? Some you'll disperse through the water mass and some might go into the bed of the river. As I understand it, most of the heat loss is through evaporation. You don't see it obviously because it doesn't come off the top of the cooling tower and it's harder to measure, but -- how do you come to that conclusion?

(Comment - Mr. David R. Helwig)

We've done quite a bit of work to try to quantify this and as you are well aware, the surface heat exchange phenomenon involves sunlight going into the water. With radiation and with the higher temperature of the water, you'll lose some into the ground around it. With once-through cooling you disperse the water and get it to a lower temperature faster. As you know, it takes a lot more area and time for all the heat to be released and to get the water back to its equilibrium or ambient temperature.

In cooling towers, when we force the higher temperature throughout this system, the predominant factor becomes evaporative cooling rather than the other components. The difference in temperature between the water and ambient conditions determines how much water is being transferred by evaporation. It is also a function of wind speed and other factors. The first reference on the back of the paper - Brady, Edinger and Guyer - deals exclusively with once-through cooling.

(Comment - Dr. Maurice K. Goddard)

Well, you know more about it, but I was surprised to see that wet tower loss is 50 percent greater than once-through cooling.

(Comment - Mr. Paul McKee)

I didn't hear anyone mention the beneficial use of waste heat. Isn't there something we can do with this heat?

(Comment - Mr. Roger Ley)

A number of studies are being made that attempt to use waste heat. I believe Long Island Electric and Public Service are experimenting with developing shellfish using hot water. Of course, Penn State has for many years been working on a means of using the water to promote accelerated plant life growth. I know of no practical applications of these uses at

the moment, but there is experimentation.

(Comment - Mr. Paul McKee)
I can tell you of one, the Potomac Electric Power Company is growing oysters in their discharge canal, just below Morgantown where Rt. 301 crosses the Potomac River. The power plant is just to the south.

(Comment - Mr. Roger Ley)
That's similar to the two I mentioned, but is that really practical or experimental?

(Comment - Mr. Paul McKee)
Experimental.

(Comment - Mr. William Strobel)
In the Susquehanna Basin at our Brunner Island electric station we have been trying for quite some time in cooperation with others to get some experimental work off the ground down there.

(Comment - Dr. Maurice K. Goddard)
Some people think that hot water from Three Mile Island can be piped into Harrisburg and used to heat the town. They think that's an easy thing to do. I think you ought to explain why that isn't a practical matter.

(Comment - Mr. Roger Ley)
The principle point is to keep the Carnot cycle in the range which gets decent efficiency from the unit. This is not only an economic advantage and therefore an advantage to the rate-payer, perhaps more importantly, it's an environmental advantage in that energy is saved. In order to get good efficiency, we have to keep the lower end of the Carnot cycle as low as possible and this means that we're talking about hot water that isn't hot enough to be useful.

(Comment - Dr. Maurice K. Goddard)
It isn't really that hot, that's the point. A lot of people think that water is a lot hotter than it really is. Someone mentioned that 90° water is not even warm enough to take a shower. You still have the problem what are you going to do with that warm water when you don't need it to heat something, like during warm summer months?

(Comment - Mr. Gregory Senko)

Mr. Helwig stated that blowdown doesn't add chemicals to the water. That's true, but it does increase the concentration and the loading. Also, I am wondering when reservoirs will be constructed by the utilities, why they couldn't be used for cooling ponds?

(Comment - Mr. William Strobel)

One of the simple answers that we got when we proposed that was that a reservoir becomes part of a stream and according to the regulations we weren't allowed to raise the temperature of the stream.

(Comment - Dr. Maurice K. Goddard)

Well, it would have to be an off-stream reservoir to be just a cooling pond and pretty difficult to fill off-stream ponds of the magnitude you would need in this hilly country to serve as cooling ponds. In Iowa or somewhere else maybe it would be easier to do, but not here.

(Comment - Mr. David R. Helwig)

The plant size makes a tremendous difference; if we're talking half a megawatt per acre or two acres per megawatt for a 2,000 megawatt plant, that's a pond with 4,000 acres with surface area.

We've gotten out USGS quadrangles, and if you make a block out of tracing paper (and the cooling ponds are about that big) -- it's about 6" square. You can't find anywhere big enough for that, that you're not impounding some significant drainage area.

(Comment - Dr. Maurice K. Goddard)

That's what I'm saying. I just don't think it's practical at all in the eastern U.S.

(Comment - Mr. Alan Karplus)

You mentioned building some small impoundments and reservoirs and filling them by pumping. Where do you plan to get the water from? Internally within the basin or are you anticipating diversions?

(Comment - Mr. William Strobel)

I mentioned it was based on the limited study that we've done to date. The most suitable location for a smaller-type reservoir that I had in mind was on small tributaries where the drainage area wouldn't be sufficient. Then we would have to pump water from a nearby larger stream. Now that water, of course, would be pumped during the higher flows in the stream. You certainly couldn't pump it during the summer season. We would be utilizing the water out of a reservoir during the summer season but filling it in the spring of the year.

(Comment - Dr. Maurice K. Goddard)

I think what he means, if I could interject, would be the Codorus Reservoir in York County. It's designed larger than the yield of the watershed and when the east branch of the west branch of Codorus Creek is at flood level, we allow them to pump to fill in the reservoir which reduces the flood flow through the City of York. It's an advantage to store those floodwaters because you would not necessarily have to bring water in from outside the basin and you might have an interbasin transfer from a very small stream. The idea would be to use water discharged from flood or heavy flows, but not allow them to pump into reservoirs for storage at low flow periods. Maybe I've over simplified it, but that's the principle.

(Comment - Mr. Roger Ley)

I can give you a specific example which happens to be in the Delaware Basin. We're studying a plant which would have a sizeable reservoir on Mill Creek, which is quite a small tributary of the Schuylkill just about a mile to Mill Creek and the dam is just a very short distance from the junction of Mill Creek with the Schuylkill. So we're talking about using the tributary merely as an area where reservoir construction is practical and using the main stream as the source of water.

(Comment - Dr. Maurice K. Goddard)

... and only pump in high flows.

(Comment - Mr. Roger Ley)

That's right, we would only pump during high flows.

SUMMARY

by
Roy G. Metzgar, Secretary to the Commission
Susquehanna River Basin Commission

The Susquehanna River Basin Compact which created the Commission provides that the States shall have the primary responsibility for water quality management and control. The Commission's Comprehensive Plan and recently adopted Water Resources Program reflect that assignment of responsibility. However, an effective basinwide approach to water quality management requires assurance that all responsible parties are aware of each other's programs, progress, problems and perspective on potential solutions. It is also important that there is common agreement about priorities which will lead to consistent and complementary activities by each partner in the river basin.

In the past few decades the Federal role has been changing in water quality management. Historically, Federal legislation was based on the principle that the States shall have the major responsibility with the Federal role limited to support through research and financial assistance. Passage of the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500) signaled an expanded Federal role in water pollution control due to increasing public concern about monitoring water pollution problems. There was also a change in philosophy with respect to the use of the Nation's waters for waste disposal purposes. Water quality management program strategy shifted from State establishment and enforcement of water quality standards to application of effluent limitations regulated by a national pollution discharge elimination permit system. This system relies on a two-phase approach first applying best practicable technology by July 1, 1977 and then utilizing best available technology by July 1, 1983.

Public Law 92-500, known as the Federal Water Pollution Control Act Amendments of 1972, is a complex piece of Federal legislation which requires a substantial State/local commitment for implementation. Each signatory State prior to P.L. 92-500 had enacted laws and initiated programs addressing water quality problems which have proved to be complementary to the Federal effort. Each State is now in the process of developing and implementing their respective programs. Under P.L. 92-500 Maryland and New York have been delegated the responsibility for administering the NPDES permit system by the U.S. Environmental Protection Agency. Pennsylvania is negotiating with EPA for that authority due to differences between State and Federal laws.

Two Federal agencies have major water quality management roles in the basin: the Environmental Protection Agency and the Army Corps of Engineers. Among the numerous EPA activities and programs the following items were noted particularly with regard to the Susquehanna River Basin and potential Commission activity:

- coordination of Federal agency review and processing of permits under Section 404;

- surveillance and analysis of water quality for toxic substances (monitoring for PCB's, for example); and

- nonpoint source water pollution problems such as assessment of sources and inter-governmental cooperation on corrective actions.

The Corps' activities in water quality include:

- planning activities;

- operation of existing reservoirs; and

- regulatory program (Sec. 404 permits).

Until last year the Corps' authority was restricted to navigable waters which meant up to Athens on the Main Stem of the Susquehanna River, Lock Haven on the West Branch and a few miles up Codorus Creek in York County, Pennsylvania. A court ruling in 1975 extended the requirements of P.L. 92-500 to all waters in the United States. Thus, all the tributary drainage in the basin will now come under Corps permitting authority through Section 404. Implementation of this authority will be staged in three phases through July, 1977.

Other specific Corps activities include program planning such as the Binghamton Wastewater Management Study, the Tioga Basin Acid Mine Drainage Abatement Study, and reservoir siting and design. Corps operation of existing and planned reservoirs through water releases can enhance downstream water quality.

In New York several State water quality-related programs are underway as well as those linked directly to the Federal law and program. Substantial State financing for treatment facilities has been approved by the voters in the past few years. There are 87 significant wastewater discharges in the New York section of the basin, 60 percent of which are considered to be abated (in compliance with standards). Ongoing planning studies of interest include the Section 208 work in Chemung and Steuben Counties on land use-water quality relationships;

water quality modeling of the Chemung River; and groundwater modeling along the Chemung River. A Section 303(e) plan has been drafted for the upper Susquehanna River and the process is just beginning for the Chemung River subbasin.

Approximately 75 percent of the 6,000 miles of major streams in the Pennsylvania portion of the basin meet or exceed water quality cirteria. Acid mine drainage is the major water quality problem with over 1,000 miles of streams affected. Available State funding is insufficient to resolve the problem. Abatement of acid drainage from abandoned mines should be given one of the highest water quality priorities.

Other Pennsylvania water quality problems are generally localized in nature and usually occur where waste discharges are large in comparison to the receiving streams. There are 75 significant municipal sewage and 42 significant industrial waste discharges in the Pennsylvania portion of the basin.

In Maryland water pollution control responsibilities are shared between the Water Resources Administration in the Department of Natural Resources and the Environmental Health Administration in the Department of Health and Mental Hygiene. Water quality studies of the upper Chesapeake Bay suggest that the Susquehanna River is a significant source of nutrients and may completely dominate the nutrient distribution in the upper Bay during high flow periods. PCB's have been detected in the upper Bay, but are below critical levels. The Susquehanna River reportedly is the primary source of this toxic material.

From an industrial perspective, the coal mining industry voiced a concern about over-regulation and duplication of effort. Coordination of governmental regulatory activity was suggested as a way to increase efficiency for everyone. The electrical power generation industry focused on disposal of waste heat, compliance with water quality regulations, and related consumptive use of basin water resources. The consumptive water losses vary with the type of cooling system and power plant water effluent temperatures.

The estimated average water consumption of basin-located electric generating plants planned or proposed for 1975-1989 exceeds 150 cfs. Beyond 1989 an additional 100 cfs will be consumed by envisaged power plants. The total 250 cfs represents about 10 percent of critical low flows at the Marietta, Pennsylvania river gaging station. Conforming to Commission requirements for compensation of consumptive uses during low flow periods means reservoir storage between 50,000 and 120,000 acre-feet, depending upon criteria to be adopted, to guarantee compensating releases totaling 250 cfs during recurrence of the record drought

year. The electric utility companies indicated a willingness to compensate for consumptive use of water at all new facilities in the basin during low flow periods. Given the usual long lead time required to develop Federally-sponsored reservoir storage projects, it seems likely that a utility-constructed reservoir will be needed to have storage available coincident with the in-service date of generating facilities.

Historically speaking, in the late 1960's and early 1970's, significant basin water quality problems were:

- Inadequately treated sewage,

- Nutrient related eutrophication,

- Acid mine drainage pollution, and

- Erosion and sedimentation.

Those problems still exist, but significant efforts have been mounted to address them, and in some instances, substantial improvements have been made. In the past four years 225 stream miles in the basin have been improved. Yet, economic development necessary to support present and future generations will continue within the region. This means that not only must previous environmental abuses and insults be corrected but action is necessary to prevent recurrences and potential future polluting episodes.

In the Pennsylvania report it was noted that "one of the most difficult tasks in the basin will be the conservation of existing high water quality where development pressures are great". Thus, in the face of good progress in improving water quality in some areas, particularly the Juniata River, 46 stream miles are reported as degraded during the past four years, thereby reducing the total improvement to a net gain of 179 stream miles.

Generally good water quality is reported for the majority of basin surface and groundwater resources. Most of the over 2,600 miles of major surface waters have high levels of dissolved oxygen and support good biological activity. There are, however, over 850 miles of surface waters that are severely degraded due mainly to acid mine drainage - the basin's leading water quality problem.

The Commission's ongoing water quality management program has been developed with an interstate, basinwide perspective. Four water quality needs are identified within the Commission's Water Resources Program:

- data collection;

- interstate water quality monitoring'

- acid mine drainage; and

- coordination.

Consequently, SRBC staff efforts for Fiscal Year 1977 in water quality are directed toward finalizing a monitoring program on interstate waters; reviewing and monitoring mine drainage abatement programs; and developing quantification data on non-point source pollution factors. This work program has been developed within the overall context of ongoing Federal, State and local efforts in water quality management. From today's meeting it is apparent that the SRBC work is consistent with or complementary to other ongoing programs in water quality management.

Summing up, the basin's present water quality problems may be magnified in the future by expected increases in the use of the Susquehanna River for power generation, waste assimilation and water supply. Greater emphasis and attention should be given to coordinative efforts between regulatory programs, thereby improving efficiency from a project applicant's viewpoint while protecting basin water supplies.

Significant progress in water quality in the basin was reported. Due to the nature of the problems, an annual perspective doesn't reveal the long-term improvements that have been accomplished. Substantial efforts are ongoing, but resolution of some problems such as acid mine drainage and untreated municipal sewage exceeds available funding. Continued public interest and support will be required to attain hoped-for water quality goals being sought in the Susquehanna River basin.

APPENDIX A

PUBLIC INFORMATION HANDOUT

PUBLIC LAW 92-500

SECTION 404 PERMIT PROGRAM

U.S. ARMY CORPS OF ENGINEERS

SECTION 404 PERMIT PROGRAM

Under the laws of the United States, Congress has assigned to the U.S. Army Corps of Engineers certain non-military functions. These include the better-known traditional missions in navigation, flood control, hydropower production, water supply storage and recreation. Congress has also given the Corps of Engineers regulatory responsibility to protect our navigation channels and harbors against encroachments and more recently to restore and maintain water quality by regulating the discharge of dredged or fill material in coastal and inland waters and wetlands. This pamphlet describes this latest regulatory program.

Authority. The basis for the U.S. Army Corps of Engineers' responsibility to regulate the disposal of dredged or fill material is the Federal Water Pollution Control Act Amendments of 1972. Section 404 of that Act charges the Secretary of the Army, acting through the Chief of Engineers, to regulate the discharge of dredged or fill material in the waters of the United States. Initially, the Corps of Engineers limited its regulatory authority under Section 404 to waters which are presently used, were used in the past, or could be used by reasonable improvements to transport interstate commerce.

Limiting the Corps' authority under Section 404 to navigable waters of the United States was successfully challenged in the U.S. District Court for the District of Columbia. On March 27, 1975, the Court directed the Corps of Engineers to extend its responsibility to regulate the discharge of dredged or fill material under Section 404 to all waters of the United States (including the territorial seas) and to revise its regulation accordingly. A proposed draft regulation was published in the **Federal Register** on May 6, 1975, for comment, and an interim final regulation was published on July 25, 1975, and became effective on that date. An additional 90-day comment period was provided to further refine the regulation.

Purpose. The purpose of this program, which is part of the Corps of Engineers' overall regulatory authority, is to insure that the chemical/biological integrity of waters of the United States is protected from the irresponsible and unregulated discharges of dredged or fill material that could permanently destroy or alter the character of these valuable resources.

This program provides for the consideration of all concerns of the public – environmental, social, and economic – in the Corps' decision making process to either issue or deny permits. As part of its responsibility to protect water quality, the Corps of Engineers' Section 404 permit program will be extended to many areas that have never been regulated before.

The public is therefore urged to understand and support this program.

Phased Program. The Corps of Engineers will expand its authority in a three-phase program over the next two years.

Phase I, effective July 25, 1975, extends the Corps' regulation of disposal of dredged or fill material to the traditional "navigable waters of the United States" and contiguous or adjacent wetlands. Phase II, effective July 1, 1976 will expand the Corps' permit program into primary tributaries of navigable waters of the United States, lakes, and the contiguous or adjacent wetlands. After July 1, 1977, the Corps will exercise its Section 404 authority over all waters of the United States.

Moderate, Reasonable Approach. The Corps of Engineers will use common sense, good judgment, and moderation in carrying out the purpose of the Section 404 permit program. The Corps and the Environmental Protection Agency have worked hard together to develop a meaningful, manageable program which will protect the quality of our waters and preserve the environmental assets of our coastal and inland waters and wetlands. Public cooperation and voluntary compliance will be encouraged, and prosecution will be recommended only when all other options have been exhausted.

Activities Included. Along with the discharge of material which has been dredged or excavated from any waters of the United States, the following additional types of activities will also be regulated by this program: site developmental fills for recreational, industrial, commercial, residential, and other uses; causeways or road fills; dams and dikes; artificial islands; property protection and/or reclamation devices such as riprap, groins, seawalls, breakwaters and bulkheads and fills; beach nourishment; levees; sanitary landfills, and backfill required for the placement of structures such as sewage treatment facilities.

Farming Exempt. The Section 404 permit program does not apply to normal farming practices such as plowing, cultivating, seeding, and harvesting. Nor does it apply to such farm and ranch conservation practices as terracing, land levelling and the construction of check dams unless they occur in a water of

the United States. However, damming of major streams, diking, and the discharge of dredged or fill material in wetlands associated with farm practices will require permits.

Grandfather Clause. Discharges of dredged or fill material which occurred in waters other than traditional navigable waters before July 25, 1975, or which are less than 500 cubic yards and will be completed within six months of that date will generally not require permits. In addition, discharges of dredged or fill material which are completed before an effective phasing date or which generally involve minor bulkhead and fills of less than 500 feet in length and 500 cubic yards in volume will not require individual permits provided certain conditions can be met. Water quality and coastal zone management certifications must be obtained before such discharges can occur, however. And the District Engineer may still require an individual to submit an application for a particular discharge falling within one of these exceptions if he feels the interest of water quality requires it.

Where to Apply for a Permit. Application for a permit under this program should be made to the nearest district office of the Corps of Engineers. Application forms and instructions are available at all district offices of the Corps of Engineers.

How Applications are Processed. A public notice is issued on each permit application. Substantive comments received from interested individuals, groups, or government agencies are furnished the applicant for his rebuttal. Often a public hearing will also be held before the District Engineer issues or denies a permit. Major controversial cases may be referred to higher headquarters for a decision.

Considerations. In evaluating a permit application, the Corps of Engineers will thoroughly analyze the impact of the proposed activity on the public interest including water quality. The benefits which may accrue from the proposal will be weighed against any forseeable detriments, and a permit will be issued only when its issuance is found to be in the public interest.

Contact with the Corps of Engineers should be made before disposal of any dredged or fill material. This could save considerable time and expense.

You Can Help. The understanding and support of the American people is vital to the success of this program. In order to protect the quality of our water resources, including wetlands, we must all join in this vital effort. We ask your help in "passing the word" to others concerning the permit requirements outlined in this pamphlet and solicit your views and comments on better ways of attaining the goals of this program. Your comments, questions and suggestions should be addressed to the nearest district office of the Corps of Engineers.

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1715
BALTIMORE, MARYLAND 21203

APPENDIX B

SUPPLEMENTS TO THE PRESENTATION

BASIN STATE REPORT - MARYLAND

by
Henry J. Silbermann

EXCERPTS FROM:

1) Maryland's Section 305(b) Report, 1975:

and

2) The Chesapeake Bay Waste Load Allocation Study
by HydroScience, Inc., April 1975

3) Policy on Phosphorus Reduction Requirements, Nitrogen Reduction Requirements, Total Chlorine Residual Limits, and Allocable Capacity Reservation for Specified Waters of the State

EXCERPT FROM MARYLAND's 305(b) REPORT 1975

Table 1-4 Satisfaction of Section 305 (b) (1) (B) Goals 1974 and 1983

SUB-BASIN	# of Segments in sub-basin	1974				1983	
		Meets Water Quality Standards					
		DO	Temp.	PH	Bacteria	fishable	swimmable
Chesapeake Bay	2	2 yes	2 yes	2 yes	2 *	2 yes	2 yes
Coastal Area	6	4 yes 2 *	6 yes	6 yes	3 yes 3 *	4 yes 2 *	6 yes
Lower Susquehanna	12	12 yes	12 yes	12 yes	2 yes 10 *	12 yes	11 yes
Pocomoke River	15	8 yes 4 * 3 no data	12 yes 3 no data	12 yes 3 no data	3 yes 9 * 3 no data	5 yes 3 * 4 no 3 no data	5 yes 4 * 3 no 3 no data
Nanticoke River	9	7 yes 1 no data 1 *	8 yes 1 no data	8 yes 1 no data	4 yes 4 * 1 no data	4 yes 4 * 1 no data	4 yes 4 * 1 no data
Wicomico River	6	3 yes 2 no data 1 *	4 yes 2 no data	4 yes 2 no data	4 * 2 no data	2 no 1 * 1 yes 1 no data	2 yes 2 no 2 no data
Choptank River	14	10 yes 3 no data 1 *	11 yes 3 no data	11 yes 3 no data	1 yes 1 no 9 * 3 no data	8 * 3 yes 3 no data	10 yes 1 no 3 no data
Elk River	13	12 yes 1 no data	12 yes 1 no data	12 yes 1 no data	3 yes 3 no 6 * 1 no data	12 yes 1 no data	7 yes 5 * 1 no data
Bush River	6	5 yes 1 no data	5 yes 1 no data	5 yes 1 no data	2 no 3 * 1 no data	4 yes 1 * 1 no data	2 yes 3 * 1 no data
Gunpowder River	7	7 yes	7 yes	7 yes	4 yes 3 no	7 yes	3 yes 4 *
Patuxent River	9	6 yes 1 no data 2 *	8 yes 1 no data	8 yes 1 no data	8 * 1 no data	1 yes 6 * 1 no 1 no data	1 Yes 6 * 1 no 1 no data
Chester River	18	11 yes 1 no 6 no data	12 yes 6 no data	12 yes 6 no data	1 yes 10 no 5 * 2 no data	6 yes 12 no	17 yes 1 no
Patapsco River	10	6 yes 3 * 1 no data	9 yes 1 no data	8 yes 1 no 1 no data	1 no 8 * 1 no data	5 yes 5 no	3 yes 7 no
West Chesapeake River	9	7 yes 2 no data	6 yes 1 * 2 no data	7 yes 2 no data	7 * 2 no data	9 yes	9 yes
Lower Potomac River	19	15 yes 1 * 3 no data	16 yes 3 no data	16 yes 3 no data	1 yes 2 no 13 * 3 no data	11 yes 7 no 1 no data	15 yes 3 no 1 no data
Middle Potomac River	7	6 yes 1 no data	6 yes 1 no data	6 yes 1 no data	2 no 4 * 1 no data	6 yes 1 no data	4 yes 2 no 1 no data
Washington Metro Area	11	3 yes 3 * 5 no data	6 yes 5 no data	6 yes 5 no data	6 no 5 no data	4 yes 6 no 1 no data	2 yes 8 no 1 no data
Upper Potomac River	19	10 yes 9 no data	10 yes 9 no data	10 yes 9 no data	2 yes 2 no 7 * 8 no data	19 yes	18 yes 1 no
North Branch Potomac River Area	10	8 yes 1 no 1 no data	8 yes 1 no 1 no data	3 yes 3 no 3 * 1 no data	5 yes 3 no 1 * 1 no data	5 yes 4 no 1 no data	5 yes 4 no 1 no data
Youghiogheny River	4	3 yes 1 *	4 yes	2 yes 2 *	1 no 3 *	4 yes	3 yes 1 no

*. Notation where neither "yes" or "no" adequately describes segment water quality. See sub-basins chapters for additional detail

CHAPTER 2

CHESAPEAKE BAY
SUB-BASIN 02-13-99

SUB-BASIN DESCRIPTION

The Chesapeake Bay is an estuary — a coastal body of water, semi-enclosed, with access to saline ocean waters and in which seawater is mixed and diluted by freshwater from land drainage. As such, it is characterized by natural fluctuations of some physical and chemical properties as well as of some of its biological process and communities. These fluctuations, whether short or long term, may be produced by meteorological influences upon the Bay proper or upon its tributary drainage basins many miles removed from Bay waters. In addition, by-products of man's activities such as sewage, sediments, herbicides, pesticides and exotic chemical compounds and metals from industrial processes are capable of causing changes which could impair the usefulness of the Bay's waters for desired purposes. Increasing demands upon the Bay from a variety of uses, such as recreational pursuits and shipping and waste assimilation, are placing a strain on the ability of the Bay to accomodate these many and sometimes conflicting demands. However, a growing awareness of the unique properties of the Bay, not only physical but also biological and economical , has dictated the demand for intensified management of this resource to protect it characteristics and use capabilities.

Physically, the Bay and tidal tributaries occupy an area of 4,400 square miles of which about 2,475 square miles are in the Maryland portion. Of these 2,475 square miles of water surface, abo 1,310 are in the Bay proper, excluding tributaries. Total length of the Bay is approximately 200 miles while Maryland's portio is 125 miles in length with a tidal shoreline of about 3,400 miles. The Bay is relatively shallow with an average depth of 28 feet in the Bay proper, and the average depth of the entire system including tributaries is about 21 feet.

The northern segment encompasses that area of the Chesapeake Bay proper (excluding tributaries) extending from the mouth of the Susquehanna River south to the original Bay Bridge (Fig. 2-1). This is an area of approximately 290 square miles with a centerline length of about 44 miles. It is characterized by a relatively shallow area (generally less than 5 feet deep) known as the Susquehanna Flats extending from the mouth of the Susquehanna River downstream to the vicinity of Spesutie Island. From this point, depths generally increase downstream to the Bay Bridge where depths of 50-60 feet are found. It is bisected by the approach channel to Baltimore Harbor where a depth of 42 feet is maintained and by the approach channel to the Chesapeake and Delaware Canal which has a controlling depth of about 30 feet.

The major tributary of this segment is the Susquehanna River which, to a great extent, controls many of the processes in the upper Bay by contributing about 90% of the freshwater inflow to this segment. Most other tributaries are essentially embayments with little freshwater inflow,and processes in these, particularly in the downstream tidal sections, are greatly influenced by water mixing in from the Chesapeake Bay. Marked variations in this freshwater inflow cause large temporal variations in salinity which in turn influence other chemical and physical processes within the Bay, thus affecting distribution and status of the biological communities.

Two major sources of the pollution products generally attributable to man's activities are largely responsible for determining water quality conditions within the upper Chesapeake Bay system. These are the Susquehanna River and the Baltimore harbor area. The Susquehanna River, which exhibits a classic pattern of high spring flows (often exceeding 100,000 cubic feet per second) and much lower flows during summer and fall (Fig. 2-2), is a primary factor in influencing the Bay's salinity regimes and is a major contributor of inorganic sediment and nutrients. The Baltimore harbor area,with several large municipal wastewater treatment plants, a great variety of industrial operations and discharges and runoff from its highly urbanized surroundings,receives a wide variety of materials which are subsequently carried to the Bay waters in varying degrees of intensity.

The lower Chesapeake Bay segment includes that portion of the Bay extending southward from the original Chesapeake Bay Bridge to the Maryland-Virginia line excluding all tributaries above their designated 'zero river mile' lines.

The lower Chesapeake Bay is a relatively wide body of water varying in width from about 4 miles at Kent Island to about 30 miles near Pocomoke Sound with a total length of about 80 miles and an area, exclusive of tributaries, of over 1,000 square miles. The western shore of the bay is generally relatively high ground with little marsh or shallow water habitat. Conversely, the eastern shore of this segment is characterized by extensive marsh areas along with relatively large areas of biologically very productive shallow water flats. The shipping channel which traverses this segment longitudinally ranges in depth from about 60 feet to more than 100 feet. Maximum depth charted in the area is about 174 off the southern tip of Kent Island.

The major tributary to this segment is the Potomac River which is the second largest river emptying into the Bay and which contributes approximately 16% of the total freshwater input to it. In comparison, the other tributaries contribute relatively little freshwater inflow.

All waters of the Chesapeake Bay Proper from the Susquehanna River mouth to the Virginia line are designated Class II for

shellfish harvesting. This includes the tidal waters of the Chesapeake Bay bounded generally by the shorelines and by 'zero river mile' lines of estuaries and tributaries to the Bay, as designated by Water Resources Administration (WRA) after consultation with Maryland Fisheries Administration.

SUMMARY OF WATER QUALITY

Water quality conditions in the Chesapeake Bay proper were generally good in 1974. The status of segments of this sub-basin with respect to water quality parameters is indicated in Table 2-1.

Dissolved oxygen values for surface samples met the standard at all stations.

Temperature standards were not contravened since there are no thermal discharges directly to the Bay at present, except for the Calvert Nuclear Power Station which is now starting up. The resulting temperatures are not expected to exceed the temperature standard for shellfish harvesting waters outside of a reasonably sized mixing zone still to be defined following studies on the effects of the cooling water use.

A number of areas were considered not acceptable for shellfish harvesting due to local violations of the bacteria standard. A majority of these are buffer zones around sewage treatment plant outfalls which discharge directly to the Bay. The bacteria standard for water contact recreation was met throughout the sub-basin.

While pH values exceeding standards were observed at a number of stations, these were associated with natural processes rather than occurring as a result of pollutant discharges.

Studies by the Environmental Protection Agency (EPA) had disclosed rapidly increasing eutrophication in the upper Chesapeake Bay during the 1969-1971 period with nutrient and chlorophyll a levels reaching higher values toward the end of this period. Examination of the 1974 data discloses reductions in phosphorus and chlorophyll a to or below values observed during the 1968-1969 period in the critical area between Pooles Island and the Chesapeake Bay Bridge. On the other hand, nitrogen values were higher in 1974 than in the previous five years, possibly as a result of non-utilization by planktonic forms since the necessary phosphorus was unavailable. Thus, there was an overall improvement in water quality observed in 1974.

As a result of the EPA studies and modeling studies contracted for by WRA, Maryland has established a policy on nutrient removal for point sources discharging directly to the Bay. This will place limitations on phosphorus concentrations in discharges as has been done by Pennsylvania for the lower Susquehanna River. This should lead to improved water quality, particularly in the upper Chesapeake Bay.

EXCERPT FROM "THE CHESAPEAKE BAY WASTE LOAD ALLOCATION STUDY"
BY HYDROSCIENCE, INC.
APRIL, 1975

SECTION I

CONCLUSIONS

1. Analysis of the data indicates that there is an overall long-term trend during summer months of increasing chlorophyll 'a' concentrations in upper Chesapeake Bay above the Potomac River. Upper Bay chlorophyll 'a' averages during July 1950 were less than 5 μg/l while the averages 15 - 20 years later were greater than 20 μg/l for center channel stations.

2. The most significant sources of nutrients to the Bay are from the Baltimore Metropolitan Area and the Susquehanna River. The latter source, under high flows, may completely dominate the nutrient distribution in the upper Bay.

3. It has been estimated from the model verification analyses that 50 percent of the discharged total phosphorus load from the Baltimore Metropolitan Area to Baltimore Harbor and 10 percent of the discharged total phosphorus load from the Back River Wastewater Treatment Plant to Back River actually reach the Bay. It is suspected that algal settling in Back River and a combination of algal settling and chemical precipitation in Baltimore Harbor retain about 90 percent and 50 percent of the discharged total phosphorus loads within the River and Harbor areas, respectively.

4. Analyses of past and present data together with the application of a mathematical model of nutrient-chlorophyll relationships appear to indicate that phosphorus is the primary nutrient that is limiting phytoplankton growth in the Chesapeake Bay. While nitrogen has an effect on growth at certain times and places in the Bay, the most significant nutrient appears to be phosphorus.

5. On the basis of the above, the first step in nutrient removal for reductions in Bay chlorophyll should be directed toward phosphorus. The removal of nitrogen will probably not have as significant effect as the removal of phosphorus with respect to the Bay proper.

6. Based on data analysis and calculations, there are significant differences in the nutrient profiles of estuarine tributaries, backwater areas and small embayments when compared to the Bay proper. Various areas in these tributaries and embayments may be nitrogen limited and/or

phosphorus limited. Detailed investigation of these areas is needed to identify the limiting nutrient, if any, but this was outside the scope of the study.

7. Projected chlorophyll 'a' levels in Chesapeake Bay proper as a function of different levels of total phosphorus discharge from the major sources such as the Susquehanna River and the Baltimore Metropolitan Area have been developed. These projection analyses indicate, for example, that if it is desired to reduce average peak values of chlorophyll to levels of the 1950's (refer to Conclusion 1) that significant phosphorus reductions of major point sources in Maryland and the Susquehanna input to Chesapeake Bay will be required. Nonpoint sources within the Maryland boundaries are felt to have a relatively minor impact on the Chesapeake Bay proper when compared to the impact of the aforementioned sources.

8. The steady state nutrient-chlorophyll model of the Bay can be successfully used as a tool to aid in preliminary evaluations of the consequences of various nutrient control measures. The model can be applied to smaller areas with finer representation and using the Bay boundary values as estimated by this study.

9. The analyses also indicate that point sources of carbonaceous wastes have a relatively minor effect on the dissolved oxygen of the Bay proper. The major impact is believed to be oxygen demanding sediments, the exact origin of which remains unclear. Hence, the controlability of dissolved oxygen in the Bay proper does not appear to be significantly related to direct point source discharges.

SECTION II

RECOMMENDATIONS

1. The modeling framework should be continually refined and further developed in the light of new data and should be used to continuously monitor the effects of nutrient control measures.

2. A detailed analysis should be conducted, utilizing the framework and results of this study, to establish an ongoing monitoring program to assess the effects of a nutrient reduction policy, if undertaken.

3. The model, as further refined or developed, should be utilized in an operational manner to periodically assess the role of nitrogen in the Bay. In particular, analyses should be conducted to monitor the results of phosphorus reductions and to project at which point in time, nitrogen and/or further phosphorus reductions would be necessary.

4. Further efforts should be directed toward determining the nutrient concentrations to be expected from the Susquehanna River under reasonable up-basin technological controls. That is, if controls of nutrients were exercised in the upper Susquehanna Basin, the expected phosphorus and nitrogen concentrations exiting from Conowingo Dam should be estimated. Reference is made to EPA Technical Report 60 which addresses this topic.

5. Because of the significant loss of nutrients in the Baltimore Harbor and Back River areas and losses in the Bay proper, a detailed investigation should be carried out on sediment-water interactions in order to determine the potential for re-release of these nutrients under future conditions.

STATE OF MARYLAND

WATER RESOURCES ADMINISTRATION

TAWES STATE OFFICE BUILDING, ANNAPOLIS, MD. 21401

POLICY

ON

PHOSPHORUS REDUCTION REQUIREMENTS, NITROGEN REDUCTION REQUIREMENTS, TOTAL CHLORINE RESIDUAL LIMITS, AND ALLOCABLE CAPACITY RESERVATION FOR SPECIFIED WATERS OF THE STATE

Purpose of Policy:

Federal and State laws, and the Memorandum of Agreement executed on September 5, 1974 between the State of Maryland and EPA, require that State and NPDES Discharge Permits be issued by July 1, 1975 for all point sources discharging into the Waters of the State. Issued permits are valid for a period not exceeding five years.

The purpose of this policy statement is to establish guidelines for effluent limitations for phosphorus, nitrogen, total chlorine residual, and allocable capacity, prior to the July 1975 deadline and in the absence of individual water quality management basin plans. As these plans are adopted, discharge permits issued thereafter will reflect requirements established by that plan. Any of the four parameters which is not specifically addressed in an adopted Water Quality Management Basin Plan, will be limited in accordance with this policy, or as it may be revised.

February 7, 1975

1. Phosphorus Reduction Requirements: For point sources discharging directly to the Maryland portion of the Chesapeake Bay the total phosphorus limit (as P) shall normally be 2 mg/l based upon a monthly average and a required removal efficiency of 80% throughout the year. For point sources discharging into embayments tributary to Chesapeake Bay, the total phosphorus limit may have an additional seasonal control requirement (March 15 through November 15) to reduce the discharge level to an average of 0.3 mg/l as P.

RATIONALE:

(a) The Hydroscience study confirms that the Maryland portion of the Chesapeake Bay is phosphorus limited.

(b) The State of Pennsylvania requires 80% removal or 2 mg/l of total phosphorus as P for point sources discharging to the Lower Susquehanna River Basin.

(c) A reduction of 80% for point sources discharging into the Bay, Baltimore Harbor and the Susquehanna River Basin, should serve to maintain the population of algae at essentially current background levels.

(d) More stringent requirements for seasonal control of point source discharges of phosphorus to embayments are based upon available studies documenting the need for additional phosphorus control, e.g. Sod Run - Romney Creek; Elkton - Elk River; Aberdeen - Swan Creek, etc. Specifically, the level of phosphorus is related to algae production and its capability to deplete oxygen levels in the embayments.

(e) The early date of March 15 was selected so that the normally sluggish embayments will be flushed before the critical algae production period in the summer.

(f) The 0.3 mg/l total P limit is readily attainable from a technical standpoint with the installation of a terminal filter, either sand or multi-media, following the clarifier to capture suspended granular phosphate particles. In fact, with existing technology utilizing chemical control, an average of 1.0 mg/l in the effluent can be achieved without a filter, and an average of 0.1 mg/l with a filter.

2. Nitrogen Reduction Requirements: No nitrogen limits shall be set at this time for point sources discharging into the estuarine waters of the State of Maryland except for the Patuxent River, the Potomac River-Metro Area, and Assawoman Bay.

RATIONALE:

(a) For Chesapeake Bay, the Hydroscience study currently being completed for WRA has determined that the Maryland portion of the Bay proper is not nitrogen limited. This will preclude any general nitrogen control requirements for the foreseeable future.

(b) In the future, where nitrogen reductions are required, these will be established and implemented on a schedule which takes into account available technology, energy requirements, and financial resources.

(c) We recognize the competition for scarce dollars to control much more important water pollution problems in the State.

3. Total Chlorine Residual Limits: The current requirements for continuous total chlorine residual control (i.e. 0.02 mg/l maximum into trout waters, a maximum 0.50 mg/l into other fresh waters, and 0.50 mg/l into tidal waters) shall be maintained.

RATIONALE:

(a) The recent chlorine residual workshop held on November 14, 1974 in Baltimore confirmed the need for effective biocide limits and that Maryland's limits were conservative and within the realm of technical control.

(b) Effective bacterial control systems are available including chlorine, bromine-chloride, ozone, ultra-violet and long term residence time. Pre-mixing and plug flow contact are essential design operating considerations for all biocides.

(c) For small plants (e.g. 0.5 MGD or less) an equalization tank ahead of an activated sludge or trickling filter type plant will simplify control requirements, particularly so, if dechlorination is required.

(d) Large plants with a design flow of 1 MGD or greater must have paced control systems to reflect changes in flow and residual

(e) The colorometric monitoring instruments, particularly those using the acid OTO test, are not acceptable tools for use in a waste water treatment plant. Careful amperometric residual measurement is required at the minimum.

(f) An ad hoc advisory group is being formed to review the requirements and to recommend possible improvements.

4. Allocable Capacity Reserve Clause: The existing WRA Regulation 08.05.04.11 C. (4) is to be revised, following public notice and public hearing, as follows:

> "This allocation is to be established with due consideration for seasonal variations and a margin of safety, whereby such allocations to all point sources will include (a) a reservation up to 50% of the total allocable load at design stream flow for the specific river segment or water region, or (b) the load established by an approved Basin Water Quality Management Plan."

RATIONALE:

(a) The existing clause states:

> "This allocation is to be established with due consideration to seasonal variations, a margin of safety, and by allocating to all point sources a maximum load not exceeding (a) 50% of the total available load for the specific river segment or water region, or (b) that load established by an approved Basin Water Quality Management Plan."

(b) The existing clause severely restricts load allocations to a maximum figure and as a result does not allow for needed judgment in complex areas or to recognize difficult operating limitations laid on very small facilities.

APPENDIX C

ATTENDANCE LIST

SUSQUEHANNA RIVER BASIN COMMISSION
5012 LENKER STREET
MECHANICSBURG, PENNSYLVANIA 17055

PUBLIC AND QUARTERLY MEETINGS
January 8, 1976
Penn Harris Motor Inn
Camp Hill, Pa.

NAME	TITLE	ORGANIZATION OR ADDRESS
John B. Mochel	Asst. to Ch. M. E.	Phila. Electric Co.
David R. Helwig	Engineer	P.E. Co.
Frank LaBar	Assoc. Hyd. Engr.	NYS DEC
John K. Robb	RB Staff Leader	Soil Cons. Service
George D. Steedle	Engineer	Huth Engineers
Eugene A. Roden	Planner	Tri County Regional Plan. Comm.
Richard Miller	Economist	Berger Associates
John Ritter	Sup. Hydrologist	USGS
Robert C. Bubeck	Hydrologist	USGS
Jeffrey T. Armbruster	Hydrologist	USGS
Ernest U. Gingrich		Michael Baker, Jr., Ir
S. E. Petty	Chief Engineer	Michael Baker, Jr., Ir
Thomas S. Ladue	Chief Environ. Service	Capitol Engineering Co
Mr. Edward V. Geismar For Dan J. Snyder	Basin Comm. Cord. Reg. Administrator	USEPA Reg. III

SUSQUEHANNA RIVER BASIN COMMISSION
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PUBLIC AND QUARTERLY MEETINGS
January 8, 1976
Penn Harris Motor Inn
Camp Hill, Pa.

NAME	TITLE	ORGANIZATION OR ADDRESS
y. Woodruff	Associate Prof. Capitol Campus	Penn State As. Middletown
t:r R. Imler	Asst. Vice President	Gwin Engineers Inc.
M Normann	Hydraulic Engineer	Gilbert Associates
. Young	Hydraulic Technician	P.O. Box 1498,,Reading, Pa. Gilbert Associates
n:th A. Barrick	Environmental Planning Manager	Glace & Glace Consulting Engineers
r:e Errick	Chief Civil Engineer	Berger Assoc. Inc.
y O'Bradley	Reporter	Patriot News
s L. Sellers	American Water Service Co., Inc.	
il T. Clapp		Valley Farm Wellsville, Pa.
J Brumbaugh	Riverton Cons. Water Co.	Box 108 Lemoyne, Pa. 17043
e: E. Crews	Chief, Urban Studies Planning Div.	Baltimore District Corps of Engineers
r: Fox	Geologist G F C & C Eng.	P.O. Box P163, Hbg.
r D. Ley	Manager-Water Resources	GPU Service Corp.
C. Richert	Hydraulic Engineer	GPU Service Corp.

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NAME	TITLE	ORGANIZATION OR ADDRESS
Anthony Petrucci	Professor	HACC
Ron Barninger	Campaign Manager	Petrucci For Congress
Russell S. Klingensmith	Sanitary Engineer	Gannett Fleming Corddr Carpenter, Inc., Hbg.,
J.E. Anderson	Licensing Engineer	GPU Service Corp. Parsippany, NJ 07054
James G. Brandon	Planning Analyst	Pa. Dept. of Community Affairs
Wm. Kvaternik	Planning Analyst	Pa. Dept. of Community Affairs
J. K. Sorgen	Chairman	West Branch Flood Cont Lock Haven, Pa.
Rose McLeod	Planning Analyst	SRBC Staff
A. K. Karplus	Hydraulic Engineer	S.R.B.C.
Richard N. Koch	Planner	Gannett Fleming Corddr Carpenter, Inc.
Terry Brown	Planner	CRPDA
Thomas G. Kelso	Planner	Lancaster Co.
John Carling	Chief, Disaster Proj. Div.	Pa. DCA
Paul B.Miller	Senior Engineer	Bethlehem Steel

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NAME	TITLE	ORGANIZATION OR ADDRESS
L. Strobel	Envir. Cont. Engr.	PP&L Allentown
J. Ratzell	SR. Proj. Engr.	PP&L Allentown, Pa.
ıko	EPS	SRBC
ɛkita	San. Engr.	SRBC
Silbermann	Deputy Director	Maryland Water Resources Administratio
McDuffie	Prof. of Chemistry SUNY at Binghamton	Bing., NY 13901
Fesenhan	Coordinator Nat'l Res.	SEDA-Cog. Lewisburg, Pa.
Roger D. Ley		Reading, Pa.
. Brown		Keystone Bituminous Coal Assn
Tredimont	Regional Planner	EDCNP
ore P. Clista	Sus. R. Basin Engr.	DER, Pa.
Rudisill	Biologist	SRBC
Witmer	Sales Rep.	Gekas for Senate

APPENDIX D

LIST OF PUBLICATIONS AND HAND-OUTS ON WATER QUALITY MANAGEMENT DISTRIBUTED OR AVAILABLE AT THE MEETING

SUSQUEHANNA RIVER BASIN COMMISSION

1. Annual Report - 1975.

2. Assessment of the Water Quality of Streams in the Susquehanna River Basin, Resource Quality Management & Protection Division, January 1976.

3. Nonpoint Source Pollution Assessment of the Chemung and Susquehanna River Subbasins, Resource Quality Management & Protection Division, September 1975.

4. Preliminary Study of Sediments from the Susquehanna River Basin in New York With Emphasis on Surficial Heavy Metal Content, Resource Quality Management & Protection Division, June 1975.

5. Publications and Staff Reports of the Susquehanna River Basin Commission, January 1976.

6. Susquehanna River Basin Compact, May 1972.

CORPS OF ENGINEERS

1. Applications for Department of the Army Permits for Activities in Waterways, Department of the Army, Corps of Engineers, EP 1145-2-1, October 1974.

2. Permits for Activities in Navigable Waters or Ocean Waters, Department of Defense, Corps of Engineers, 33 CFR 209 Federal Register, V. 40, N. 144, Part IV, July 25, 1975.

3. Plans for Choice: Binghamton Wastewater Management Study, Department of the Army, Corps Engineers, Baltimore District, November 1975.

4. Questions and Answers Related to Corps of Engineers New

Regulation Covering Section 404, P.L. 92-500, U.S. Army Corps Engineers, EP 360-1-7, October 1975.

5. Section 404 Permit Program, Department of the Army, Corps Engineers, no date, (hand-out).

6. Tioga River Basin Mine Drainage Abatement Study: Public Meeting, Department of the Army, Corps Engineers, Baltimore District, May 1974.

U.S. ENVIRONMENTAL PROTECTION AGENCY

1. A Drop to Drink, U.S. Environmental Protection Agency, Office of Public Affairs, Washington, D.C., Revised June 1975 (pamphlet).

2. Building for Clean Water, Federal Grants Lend a Hand, U.S. Environmental Protection Agency, Office of Public Affairs, Washington, D.C., August 1975.

3. Highlights - An Environmental Law: The Federal Water Pollution Control Act Amendments of 1972, U.S. Environmental Protection Agency, Office of Public Affairs, Washington, D.C. 1973.

4. Highlights - An Environmental Law: The Marine Protection, Research and Sanctuaries Act of 1972, U.S. Environmental Protection Agency, Office of Public Affairs, Washington, D.C., December 1972.

5. Hill, Gladwin, Cleansing Our Waters, Public Affairs Committee, Public Affairs Pamphlet No. 497, New York, Revised February 1974.

STATE OF NEW YORK

1. New York State Report on Water Quality Planning and Manage-

ment Programs, New York State Department of Environmental Conservation, no date. Contents include:

a. NYS Environmental Conservation Law (SPDES Program, Realty Subdivisions, etc.)

b. P.L. 92-500 - Planning & Management Programs (Status)

   1) 208 Planning
   2) 303(e) Basin Plans

c. State Environmental Quality Review Program (SEQR)

d. Environmental Management Councils

e. Soil & Water Conservation Planning

f. Freshwater Wetlands Program

g. Wild & Scenic Rivers Program

2. Pure Waters Progress in New York State, New York State Department of Environmental Conservation, July 1974.

COMMONWEALTH OF PENNSYLVANIA

1. Abatement of Pollution From Abandoned Mines in Pennsylvania: A Progress Report, Department of Health, Sanitary Water Board, Pub. No. 26, March 1970.

2. Bartal, Kenneth A., and Gutierrez, Leonardo V., COWAMP - A Creative Approach to Water Quality Management Planning, Pennsylvania Department of Environmental Resources, Bureau of Water Quality Management, Pub. No. 37, Revised November 1974.

3. Helpful Hints on On-Site Sewage Disposal System Construction, Operation and Maintenance, Pennsylvania Department of Environmental Resources, Bureau of Community Environmental Control, no date.

4. Is COWAMP Just Another Collection of Data to Gather Dust on the Shelf?, Pennsylvania Department of Environmental Resources, Bureau of Water Quality Management, no date (pamphlet).

5. Publications, Pennsylvania Department of Environmental Resources, no date.

6. Summary - Critical Area Policy Recommendations, Pennsylvania Department of Environmental Resources, ECONOTES - Special Master Plan Edition, V. IV, N. 3, December 1975.

STATE OF MARYLAND

1. Silbermann, Henry, "Water Pollution Control and Water Resources Management in the State of Maryland: Report to the Susquehanna River Basin Commission," January 8, 1976.

2. Silbermann, Henry, "Water Pollution: Now it is Defined and Measured," January 5, 1976.

3. Silbermann, Henry, "Water Quality Management in Maryland's Portion of the Chesapeake Bay," January 5, 1976.

4. A Publications List for the Maryland Department of Natural Resources From 1970 through 1974, Department of Natural Resources, Public Information Office, February 1975.

See also, Appendix B.

INDUSTRY

1. Helwig, David R., "An Overview of Heat Rejection From Electric Generating Facilities," December 20, 1975 (Contents Presented in this Document).

2. Strobel, William N., "Susquehanna River Basin Electric Utility Steam Generating Stations Environmental Considerations for Water-Related Facilities," January 8, 1976 (Contents Presented in this Document).

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